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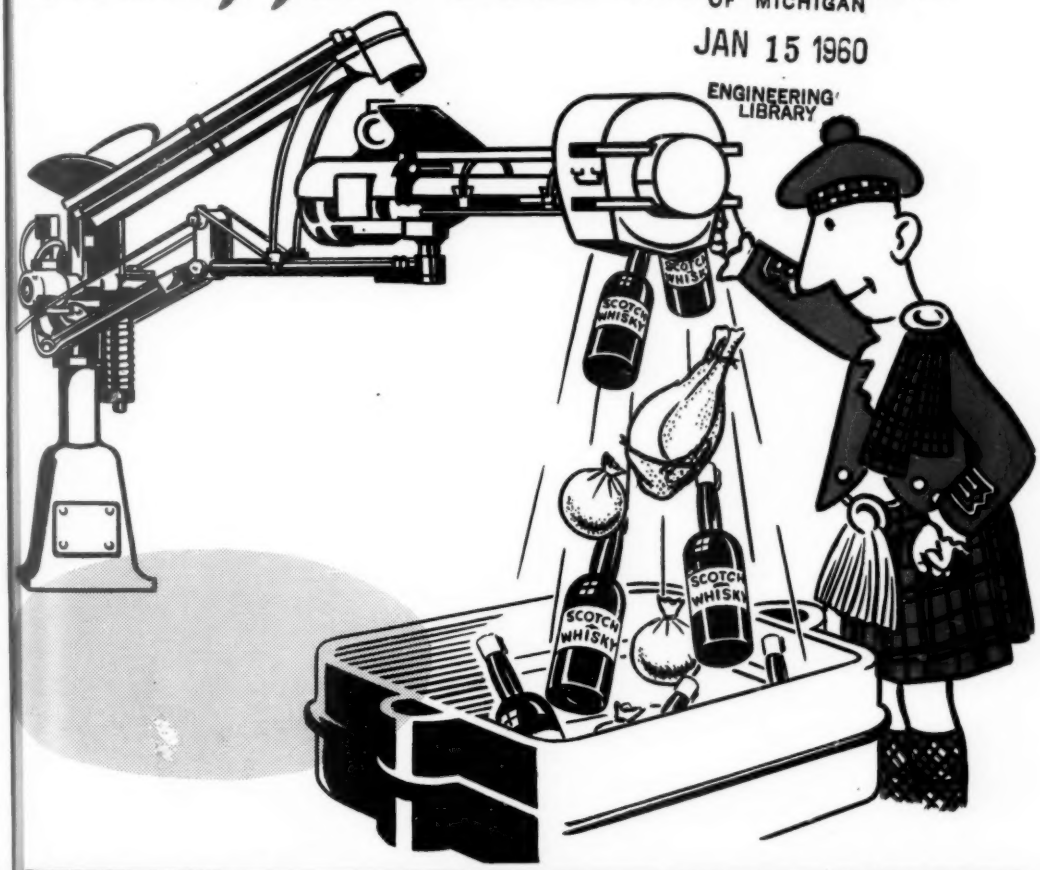


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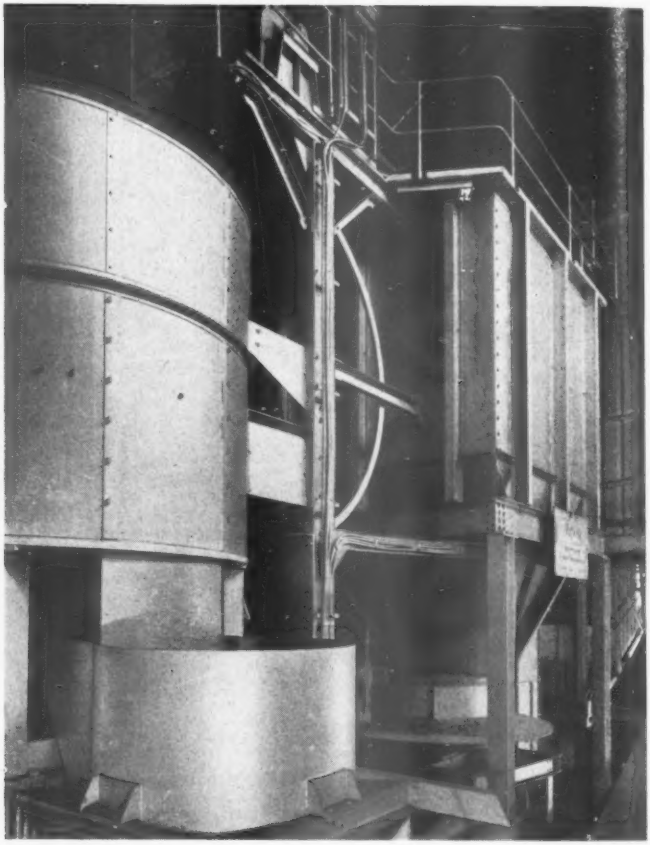

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FOUNDRY
TRADE JOURNAL

Vol. 107 DECEMBER 24, 1959 No. 2246

# New Export Service Bulletin

Each morning, we receive from the Export Services Branch of the Board of Trade, several wads of cyclostyled documents carrying the captions: " Call for Tenders ", or " Export Opportunities ", or " Economic Report ". Only a very small proportion of these—covering as they do the whole field of commerce—is of even indirect let alone direct interest to the foundry industry. Yet as a whole they are of outstanding importance. However, the service in its present form is alike wasteful of paper and time and, wisely, the Board of Trade has decided to discontinue it on January 1. It is to be replaced by a tri-weekly *Export Services Bulletin,* designed to economize in time and material; the cost to recipients is to be increased to £10 from the old figure of £2 10s.

The services rendered by the Board of Trade are widely recognized as being of an exceptionally high order and are the envy of foreign businessmen. Yet we doubt if they are appreciated by U.K. foundry owners because, in their view, the operations seem to be too remote from actual day-to-day trading. Some of the overseas enquiries listed by the Board are of such small value that they query the wisdom of passing them through the Government machinery. To go from the general to the particular, we recall how there was once issued an enquiry from a large gas-cooker foundry for an odd ton or two of special pig-iron, probably for experimental purposes. As a result of its reaching a large number of pig-iron suppliers, about ten travellers in ten cars called on the concern and whilst perhaps the firm booking the order broke even, yet there was no doubt a loss to the industry as a whole. We are obviously unaware how much it costs to put out each Board of Trade call for tenders, but to our mind, unless they result in a firm or firms breaking into a new market, any having a profit value less than £100 cost the country as a whole more than the inquiry is worth.

Firms should use the services of the Board of Trade much more than they do. If a regular line of exports is vanishing, there is every reason why this should be brought to the Board's notice. If overseas representation is sought, advice from the BoT can be invaluable, for this is a most difficult problem. In plain English, no private firm has anything like the world-wide commercial coverage as that which has been organized by the Board of Trade, through the various Embassies and Consulates. We used their services for reports on the export possibilities of engineering patterns and received reports from a number of industrial centres overseas. They carried the warning that " on the spot " last-minute alterations to design was the major stumbling block to overseas business of this nature. As soon as we receive the new *Bulletin*, a review will be made as to its potential value to readers.

# BSFA Banquet

## EXTRACTS FROM SIR LESLIE ROWAN'S SPEECH

It is only rarely that after-dinner orations carry a serious tone, but at the banquet of the British Steel Founders' Association, held on December 2, the speech by Sir Leslie Rowan was of outstanding importance. As a Treasury official, as Economic Minister at the British Embassy, Washington from 1949 to 1951, and now as a director of Vickers, Limited, his record is such as to give much weight as to his pronouncements. He had been asked to deal with the future of the steelfounding industry during the next 25 years, and based his thoughts on the fact that 50 per cent. of the production of steelfounders was either directly, or indirectly, exported. Thus, the future was bound up with the ability to export. To put this figure into perspective, he pointed out that during the decade before the war, the figure was but 20 per cent., whilst in 1958, it was 43 per cent. Another important pointer was the direction of international trade, and continuing with the comparison with pre-war days, exports to USA, Canada and to the rest of the sterling area have increased by 4 per cent. each. Where losses have taken place, they have been to those countries outside Europe, where in recent times, there has been the greatest increase in exports.

Sir Leslie insisted that there had been a quite different outlook by Governments during the period under review. In the 1930's, the attitude was protectionist and restrictive, whereas to-day, it was one of liberalization and freedom. This country, he said, lived on exports, but they were "postponed exports." People could not postpone the buying of bread and meat, but they could put off buying machine-tools and industrial plant, and this fact placed this country in a different category from most. Not an economic, but a political issue and one which exercised a banal influence on British trade was the India/Pakistan dispute over Kashmir. That dispute was more likely to be settled through the good offices of the International Bank than by any other single institution.

Whilst the overall picture of increased exports appeared to be favourable, yet it was not entirely rosy, and in this connection, there were three factors. They were: The attitude towards trade: international co-operation, and the maintenance of a high level of employment. The outcome of the divisions now being created between the six- and seven-nation treaties, Sir Leslie also described as not being too rosy, as too little account was being taken of the two transatlantic powers, Canada and USA. Attention must be given during the next 25 years to competition from Russia and other countries. Finally, the undeveloped countries, he said, would find it difficult to match their natural resources with the ever-increasing populations so as to provide a reasonable standard of living.

### AFS Congress and Exhibition

The American Foundrymen's Society announces that the 1960 Castings Congress will be held in Philadelphia from May 9 to 13. With it is to be held an exhibition of foundry equipment at which many new developments will be shown for the first time.

# Lighthearted Swedish Sculpture

At Christmastime a certain amount of lightheartedness is permissible even in the most sober of publications, and it is in this vein that the JOURNAL reproduces the picture below—where the sculptor certainly uses an old medium in a new and whimsical manner. These curious metal figures, by Carl Milles, stand in the Milles Garden, Stockholm. [The Editor is indebted to Mr. James Carr for submitting this photograph.]

## *Craft Apprentices' Corner**

# Use Spinners for Clean, Slag-free Castings . . .

## . . . with "Tubal Cain" on the Job!

Talking to a feilow foundryman t'other day, malleable man 'e was, by the way, an' we got on to discussin' slag inclusions in castings. Bein' a malleable founder o' course, this was of particular importance to 'im, an' like so many more malleable blokes 'e preferred the use of a spinner-type slag trap. Seems 'e'd tried other ways an' means, but all the same 'e 'ad to come back to 'is spinner to get good results. Well, I let that pass by 'cos I've a pretty open mind about it meself, .tho' I do agree that if it is intelligently used the spinner takes a bit o' beating.

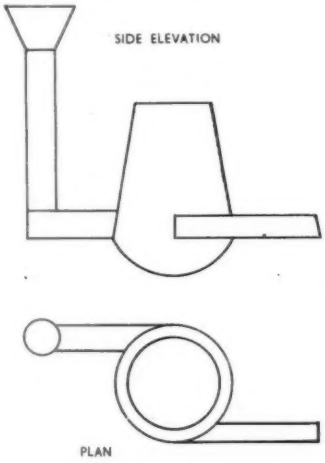



FIG. 1.—*The spinner-type slag trap is positioned between the downgate and the mould cavity.*

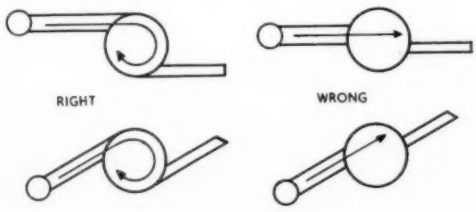
**For a spinner to operate properly, . . .**

Well now, a bit later on this feller takes to ruminating, chiefly about the historical background of 'is favourite spinner, an' seems to be a little bit peeved about the fact that what has allus been regarded as the malleable founder's own private property has, in recent years, been adopted by a few steelfounders an' a few grey-iron founders. Ain't nothin' to be peeved about *there*, after all, if it's something that's goin' to be helpful to other founders an' maybe help 'em to produce a better casting he really should be pleased about it! But no—'e only feels contempt for "folks wot ain't clever enough to devise systems o' their own, without 'aving to pinch somebody else's ideas. Shows how clever they are," 'e goes on, "they can't even use the idea properly. Altho' on the whole the steel men seem to do fairly well with it, the grey-iron men don't seem to get very good results." Now I 'ad to agree with this, an' I've run up against quite a few grey-iron founders who have condemned the spinner as being "no . . . . . good, mate," but in such cases I'm pretty sure the answer is simple enough—the spinner just ain't being used intelligently. Let's have a closer look and see what's what.

**. . . the metal must enter at an acute angle.**

The spinner-type slag trap is placed intermediate between the downgate and the mould cavity, and usually looks something like Fig. 1. The incoming metal (to the spinner) is introduced at a tangent, and the outgoing metal (from the spinner) is taken off, also at a tangent, from the opposite side. The net result is that a whirlpool effect is created in the spinner, and any slag which happens to be present is caught up in the whirling stream, rises to the top, and is retained in the spinning eddy while clean metal passes into the mould cavity. Simple, eh? Right! Why, then, does the spinner often fail to do its work? The reason is that it is not always realized that for the spinner to create an efficient whirling effect, it is essential that the metal enter the spinner at an acute angle, as in Fig. 2, and the same applies, of course, to the outlet.

FIG. 2.—*The metal must enter the spinner at an acute angle, as shown on the left.*




*As is usual in this series, the popular jargon of the foundry has been retained in some parts of the article. Apologies are made to translators.—EDITOR.

*Craft Apprentices' Corner*

**To make the spin fast and effective . . .**

There is often controversy as to whether the "ridges" (runner bars, channels, trenches, gullies, call them what you will) should be cut in the cope or in the drag; personally, I think it is unimportant —what *is* important is getting the metal to spin fast and effectively, at the same time throwing the entrapped slag high enough to be well out of the way of the outgoing metal stream, as in Fig. 3.

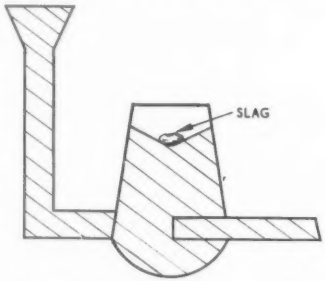
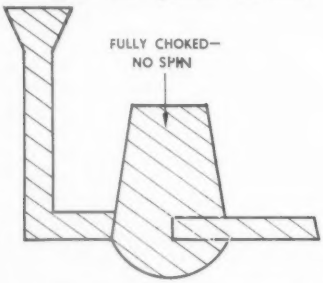



FIG. 3.—*The metal must spin fast enough to throw the slag up out of the way of the outgoing metal stream as shown above.*

In order for the metal to spin fast enough to be at all effective it is obvious that it must have a free upper surface, and this can only be achieved by the correct balance between the cross-sectional areas of the ingoing and outgoing metal streams, and the diameter of the spinner. The ingoing stream should be slightly larger in cross-sectional area than the outgoing one—in this way the system will be slightly (not fully) choked, and the head of metal inside the spinner will have a free surface.




When conditions are such that the spinner is *fully* choked, insufficient spinning action is taking place, and altho' the spinner may trap some of the entrained slag even under these unfavourable conditions, it will certainly not be so effective as it should be. Look what happens sometimes . . .

**. . . the metal stream should be *slightly* choked—**

Occasionally in the malleable foundry a certain job gives trouble from slag inclusions, and during the subsequent investigations it is decided to test the spinner visually for efficiency. Right. On a specimen mould the spinner is "tubed thro'," that is, it is continued right thro' the cope so that it is open to the atmosphere. The mould is poured, the metal in the spinner creates its whirlpool, the slag whizzes round merrily in the centre of the eddy and everybody is quite happy—until the next day, when the trouble is just as bad as before. Hard luck! Somebody has deluded himself into thinking that the spinner was working efficiently. He has overlooked the fact that, by increasing the height of the spinner, he has given the metal a free-spinning surface, a surface which the closed top of the spinner was previously choking, as is shown in Fig. 4.

**. . . grey-iron founders please note!**

This is undoubtedly the reason why grey-iron founders often fail to find satisfaction when adapting the spinner to their work. The process of pouring malleable iron is fundamentally different to that of grey iron. The malleable man scorns the use of a pouring basin and pours his metal stream directly into the downgate. His gating system is therefore choked not at the pouring basin, but at the point where the metal leaves the spinner. The grey-iron founder using a spinner for the first time naturally follows his usual practice, and provides his downgate with a generous pouring basin, thereby choking his system completely—result, no spin in his spinner, slag in his castings, and dissatisfaction with the result of his efforts.

**Spinner-feeders *can* be effective, . . .**

So far, we have considered the spinner simply and solely as a slag trap incorporated in the gating system. However, the underlying principles can also be incorporated into a side-feeder, so that one then has what may be termed a "spinner-feeder." What, then, will the difference in operation be? We know that a side-feeder, to be effective, needs to be of a reasonable size, and that the connecting neck (to the casting) will also have to be fairly large—the neck will certainly be much larger than the ridge leading from the downgate to the spinner-feeder. If what has previously been said about the relationship of these two is correct, then it would seem impossible for the spinner-feeder to be effective. This is not so.

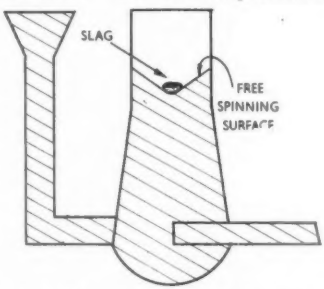



FIG. 4.—*If it is decided to test an open spinner visually for efficiency, care must be taken not to overlook the fact that an increase in spinner height may create a free-spinning metal surface in place of one which was previously choked by the closed top of the original spinner.*

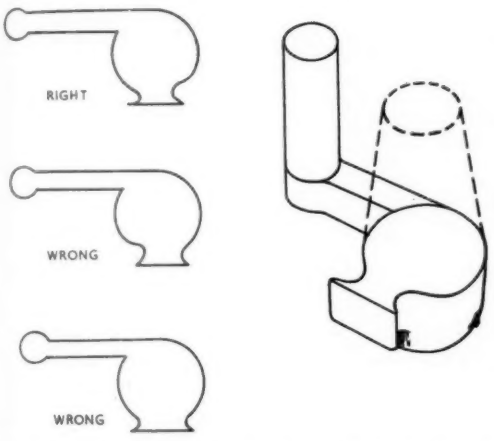



FIG. 5.—(*right*) *Perspective sketch of the design of a side-feeder/spinner and its tangential inlet;* (*right*) *plan views of right and wrong ways of moulding the sides of the spinner.*

**. . . if correctly designed, since . . .**

For a spinner-feeder of this type to be effective it requires a velocity of metal sufficient to maintain a continuous spin: thereafter the design of the spinner-feeder is the controlling factor. In this case, the base of the spinner-feeder should be fairly deep and well-rounded in order to create spin, and it is perhaps best if the ridge from the downgate is cut in the drag. Attention should be given to the shape of the spinner in the area of the connecting neck—it should not be truly circular at this point and, indeed, requires to be flattened-off somewhat on one side, as in Fig. 5.

**. . . spin is created in the feeder "bowl."**

When a spinner-feeder of this type is used its mode of operation is rather different from the one previously outlined. Molten metal enters the feeder and spin is immediately created in the "bowl" of the feeder. As the level of metal in the feeder reaches the connecting neck it flows over the lip of this and into the mould cavity. Provided that the velocity of spin is maintained in the feeder, no slag should enter the casting—it is important to realize that the level of metal in the feeder rises only at the same rate as the level of metal in the mould cavity, as is demonstrated in Fig. 6. That's it, then! The rules are simple enough, but you've got to stick to 'em if you want your spinner to work. And you can take it from me that when it's *intelligently* used it's a very good slag trap indeed! Try it, and see for yourself!

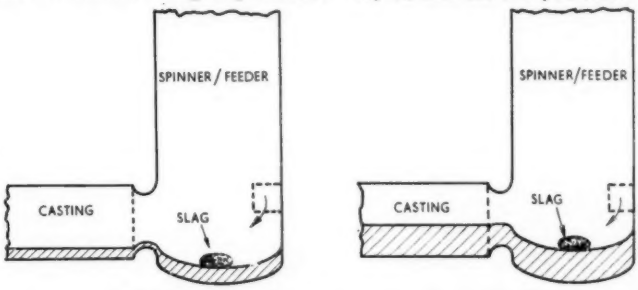



FIG. 6.—*It is important to realize that the level of metal in the feeder rises only at the same rate as the level of the metal in the mould cavity.*

## Leyland Link with Spanish Company

A financial link-up has been made by Leyland Motors, Limited, with the Spanish automobile company of Empressa Nacional de Autocamiones S.A., manufacturers of Pegaso commercial vehicles. This factory was visited by participants in the recent International Foundry Congress. Sir Henry Spurrier, chairman and managing director of Leyland Motors, Limited, and Mr. Donald G. Stokes, the company's general sales and service manager, have accepted an invitation to join the board of directors of ENASA. Mr. Stanley Markland, Leyland's works director and managing director of Albion Motors, Limited, has agreed to act as technical consultant for manufacturing and production processes at the Spanish factories.

Leyland and ENASA under an agreement signed some time ago, have been interchanging technical information on the development of commercial vehicles. Now the Leyland company has purchased a substantial share holding in the Spanish company, which is sponsored by an organization known as the Instituto Nacional de Industria.

## Half-year Results of Metal Box Company

Interim dividend for the year to March 31, 1960, is being raised by the Metal Box Company, Limited, to 4 (3½ equivalent) per cent. Total for 1958-59 was equal to 8¾ per cent., adjusting for a one-for-two scrip issue. Group net profit for the half year to September 30, 1959, declined to £2,017,000 (£2,221,000), but indications are that the result for the year will be about the same (£3,913,000) as for the last financial year. Sales rose to £39,021,000 (£38,035,000), but the actual volume of sales was even greater because of policy decisions to reduce prices and to pass on savings arising from improved techniques.

Of the 1,000,000 shares subscribed for in the Steel Company of Wales, Limited, in 1957, 750,000 have recently been sold for £1,700,000 which will be used to finance various plans for expansion. Four new factories—at Speke, Arbroath, in Italy and South Africa—are planned, and it is expected that the building of the company's first Scottish factory will begin in February or March of next year.

# British Standards Institution

### *Committee Meetings and Standards*

Meetings of two sub-committees of the British Standards Institution—ISO/TC 24 SC1 and 2, Sieves—were held at The Hague in October. In sub-committee 1, which deals with test sieves, useful conclusions were reached on such matters as the designation of test-sieve apertures, and on the completion of a series of 19 aperture sizes. It is expected that a draft ISO proposal covering this international range of aperture sizes will be prepared in the near future. General principles for future discussion on tolerance for mesh aperture and for wires for woven wire sieves were laid down, and following discussion on aperture dimensions of perforated plate sieves, the German secretariat was asked to prepare a document showing a comparison of dimensions at present in use in various countries.

At the meeting of sub-committee 2, which deals with methods of using test sieves, it was decided that the secretariat should immediately prepare a draft ISO proposal on recommended procedure for test sieving. In addition, the meeting defined certain user requirements, and also recommended that in presenting the results of test sieving, a tabular presentation should be given on all occasions. This it was decided could be followed by suitable graphical presentation.

The ISO/TC 48 committee (laboratory glassware), held its sixth meeting last month in London, when substantial progress was made in reaching agreement on internationally acceptable recommendations on: interchangeable spherical joints; one-mark volumetric flasks; one-mark pipettes; graduated pipettes; thermometers for precision use: calorimeter thermometers; hydrometers for general purposes; and procedures for testing chemical resistance of glass and glassware.

Other subjects discussed included general purpose glass stopcocks, methods of verification and use of volumetric glassware, and adjustable-range thermometers.

#### Standards Available

In the December issue of BSI *News*, is announced the publication of the first part, "Ropes and Fittings," of the Institution's Handbook No. 4, Lifting Tackle; price 30s. This is a revision of the earlier (1946) publication covering sections 1, 2, 3, and 7, edited by Mr. L. Linder. With one exception all the standards have been revised since 1946 and are now reproduced in full. They cover fibre ropes, engineering wire ropes, steel wire for ropes, Bordeaux connections, bulldog grips, sockets, thimbles, rigging screws and stretching screws, capping metal, galvanizing, and wire rope slings. The editorial notes have been entirely rewritten and deal with such matters as factors of safety, types and constructions of ropes, use and examination of wire and fibre ropes, storage, handling, coefficients for estimating rope tensions in pulley systems, terminal splicing, etc. The final section is devoted to the statutory requirements.

Also announced in this issue are the following New British Standards:—3141: Master schedule of wrought steels. Part I:1959, Carbon Steels, price 10s., which covers the chemical composition for carbon steels necessary to meet all normal requirements. The steels are set out on a basis of chemical composition, with mechanical properties included where appropriate. BS 3156:1959, Methods for the sampling and analysis of fuel gases, price 25s. Methods described include the constant-volume and soap film method, and the Metro method for nitrogen, and BS 3176:1959, Printed matter and stationery, A and B series of trimmed sizes, 4s., which gives details of the international trimmed (finished) sizes of paper intended for administrative, commercial and technical uses and printed matter such as forms, professional periodicals and catalogues. The sizes do not necessarily apply to continuous stationery. Under New Aircraft Standards are listed:—L 74:1959, Aluminium/magnesium alloy ingots and castings, 2s. 6d.; L 75:1959, Aluminium/silicon/magnesium alloy ingots and castings (solution treated and precipitation treated), 2s. 6d.; L 78:1959, Aluminium/silicon/copper alloy ingots and castings (solution treated and precipitation treated), 2s. 6d., and L 79:1959, Aluminium/silicon/copper alloy ingots and castings, 2s. 6d.

BS 131:—Notched-bar tests. Part 2: 1959 Charpy V-notch impact test, which comes under Revised British Standards, specifies the conditions for carrying out the Charpy V-notch impact test on metals, including nominal dimensions and tolerances for both steel and non-ferrous test-pieces. Also specified are structural and dimensional requirements for the testing machine and a note concerning the installation of the testing machine is given in an appendix. The price of this standard is 4s.

British Standards Reviewed and Confirmed include BS 1643:1950, Vernier height gauges (with published amendment) and BS 1889:1952, Dimensions for foundry moulding boxes. Amendment slips have been issued to BS 329:1957, Round-strand and flattened-strand steel-wire suspension ropes for lifts and hoists (amendment No. 2) PD 3540, and to BS 3063:1959, Dimensions of gaskets for pipe flanges (amendment No. 1), PD 3526. New work has been started on Steels for use in the chemical, petroleum and allied industries (revision of BS 1501-1506) and also for low-temperature and supplementary requirements of these steels (revision of BS 1510); reprints now available include BS 2629:1955, Pallets for materials handling suitable for transport by road and rail (2s. 6d.).

Amongst the several draft standards circulated for comment, those of major interest to foundrymen are A 1051, Reference tables for copper/constanan thermocouples (8 pages); A 2066, Industrial eye protectors. Part I—Eye protectors for general use, excluding high-velocity hazards (16 pp.); A 2344, Small domestic hot-water supply boilers (15 pp.); and A 2663, Diaphragm ball-valves (14 pp.).

Copies of these standards may be obtained from the sales branch of the Institution at 2, Park Street, London, W.1. When ordering amendment slips the PD reference number should be quoted, and draft standards which are free to subscribing members, cost non-members 3s. 6d. a copy up to 20 pages, and 5s. for standards of over 20 pages.

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## Harborough Construction Deal

The Harborough Construction Company, Limited, of Market Harborough, Leicestershire, which manufactures foundry supplies, is to be taken over by the Crosby Valve & Engineering Company, Limited, of Wembley, Middlesex. The Leicestershire firm's managing director, Mr. W. E. Warrington, has issued the following statement, "Shareholders of the Harborough Construction Company, Limited, have accepted an offer of the Crosby Valve & Engineering Company, of Wembley, Middlesex, and this company will assume control as soon as all formalities have been completed, probably by the end of the year. The Crosby company is an old-established engineering firm with world-wide connections and it is hoped that the fusion of the companies will be for the benefit of everyone connected with the two concerns."

# Madrid Congress Papers

*Short Synopses of the World's Principal Contributions to International Foundry Technology*

**The following abstracts conclude the survey of technical papers* presented to the 26th International Foundry Congress, held in Madrid in October. The sixteen contributions summarized in this issue are the seven which were given in French, and the nine which were in German.**

## Hydrodynamics in Running Systems for Sand Moulds

*By Michel Jeancolas, Georges Cohen de Lara, and Hubert Hanf (France) [in French]*

In recent years, formulæ from classical treatises on hydraulics have been proposed for the determination of gating-system dimensions, and for the calculation of sand-mould filling rates. The authors now present a work on these subjects, consisting of a theoretical and an experimental section. The former is a review of up-to-date notions in hydrodynamics that a foundryman can use as an aid to determining a suitable gating system. The theoretical development on these subjects has deliberately been kept short, and the essential data resulting from them are presented with emphasis on their physical rather than mathematical aspect. For example, a certain number of fundamental parameters are set out, the effects of which have been studied experimentally on several of the gating systems most commonly used in moulding practice.

*Results of Flow Tests*

After commenting on the similarity of the flow behaviour of fluids at room temperatures in Plexiglass models to that occurring in molten alloys cast in sand moulds, the authors present the results of a fairly large number of these flow tests carried out with water, mercury, etc. They then go on to describe a new experimental method which has been developed. The initial results of these tests are also given:

(1) Flow effects observed with molten alloys in sand-mould gating systems are very similar to those associated with run-off of fluids at room temperature in models with an identical mould cavity, thus confirming the value of purely hydraulic experimental methods. Wherever major differences occur—which is especially the case where small-diameter gating systems are used for pouring alloys at a comparatively low temperature—these are probably due to the cooling of the alloy as it progresses through the feed system. Furthermore, where gating systems are subjected to considerable stresses during pouring, the results may be affected to some extent by changes in the dimensions of the system caused by thermal shock, or by erosion. However, this is by no means general, and it is entirely up to the foundryman to see that it does not arise.

(2) The flow distribution in a gating system depends solely upon the ratio between the ingate and the cross-sectional areas of the entire system.

(3) Although overall flow through a gating system can be obtained from a formula derived from the application of the laws of hydrodynamics, no very high degree of accuracy may be expected if the values of the essential factors, *i.e.*, the head loss coefficients—have not been determined experimentally for the particular gating systems considered.

(4) Considerable caution is required when using the coefficients generally found in hydraulics formulæ. Comparatively few of these have been been published, except for those issued by various manufacturers of water-supply systems and fittings for their own particular equipment. In the authors' opinion, only an experimental approach is satisfactory for present gating-system designs, and they list the coefficients for a few specific system layouts, which they found by carrying out tests with water.

Although an initial comparison between the results of tests with fluids at room temperature, and actual molten alloys is given in this paper, no exact values can be given for the head loss coefficients obtained from the initial tests with molten alloys cast in sand moulds until the present series of tests has been completed.

## Significance of the Size and Quality of Coke in the Working of a Cupola

*By Roger Loison, Louis Soubrier and Maurice Decrop (France) [in French]*

The purpose of this study was to determine and confirm by experiment the quality of coke best suited for use in a foundry cupola. Two series of tests were carried out, in two cupolas of 28-in. dia. The first cupola was used for fairly short runs (3 to 4 hr.) with nine different qualities of 3.5- to 4.7-in. coke (one of these qualities was also studied in other sizes). All the runs were made with the same coke ratio, and results were classified according to the temperature of the cast-iron or the thermal efficiency. With the second cupola, 10-hr. runs were carried out with sixteen different grades of 3.5- to 4.7-in. coke, except for two unscreened lots which

* The complete set of papers have been assembled into one loose-leaf volume. Readers interested in acquiring it should write to the Congress secretary, José Andrés, *Instituto del Hierro y del Acero, Cuidad Universitaria*, Madrid. Price available on application.

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served as a control for studying the significance of size. The screened lots were in fact of different sizes when actually used, owing to deterioration during transport. The tests were conducted at a constant cast-iron temperature, but with various coke ratios, and the grades were classified according to thermal efficiency.

*Laboratory Tests*

Side by side with these tests in the cupola, laboratory measurements were taken of the characteristics of the various grades of coke which might affect their behaviour in use: proximate analysis, elementary analysis, graphitization index, real and apparent density, porosity and reactivity. This last characteristic was measured first on a granulated sample at low temperature (1,000 deg. C.), and afterwards at high temperatures (1,200 to 1,500 deg. C.), when action is far more rapid and restrained less by chemical reaction than by diffusion of the gaseous products through the pores of the coke. This brought in the question of size and surface area, and necessitated the measurement of large samples (prisms of 16-cc. volume) so as to keep conditions as close as possible to those encountered in practice. A highly satisfactory relation was observed between reactivity (at 1,400 deg. C.) and apparent density of the coke, thus showing that porosity is the determining factor. Brittleness was estimated by means of a MICUM drum screening at 3.1 in. (Index $M_{80}$).

*Results*

With coke of constant quality, ranging in size from 1.6-2.4 to 3.5-4.7 in., cast-iron temperatures were found to be highest and hourly output lowest for the largest average sizes. These results tallied well with observations made on temperature ranges in the cupola, and on the composition of the flue gases. Coke which varied greatly in size gave distinctly less satisfactory results than screened coke, even if the latter was of smaller average size. Most of the intrinsic qualities of coke seem to have no effect on their practical efficiency, the only correlations observed being the following: (1) Thermal efficiency or cast-iron temperature fell as reactivity increased; this was observed with reactivity at 1,000 deg. C. for the first series of tests and 1,400 to 1,500 deg. C. for the second, when it became necessary to take account of the surface area of the coke at the time of use, since this varied so much owing to differences in the amount of deterioration suffered in transport. No relation was found between the reactivity of the various grades of coke and the composition of the flue gases; (2) thermal efficiency increased with the resistance of the coke to fracture (Index $M_{80}$); this relationship was verified by both series of tests. Further trials are now in hand.

## Refining Pig-iron with Oxygen and Lime-dust

*By B. Trentini, P. Vayssiere, J. Francais and M. Allard (France) [in French]*

This is a report on blowing lime-dust suspended in pure oxygen in pig-iron refining. Lime injected this way has excellent reactivity and rapid solution. For several years IRSID have conducted many research projects in this field, and this is a summary of the results obtained with three refining processes.

The first process relates to conversion steelmaking, or more specifically to the OLP (oxygen, lance, powder) process, which consists of refining pig-iron in a vessel of the converter type, using a lance blowing lime-dust suspended in pure oxygen. Various types of converters described emphasize the flexibility of the process (new 50-ton symmetrical converter, 30-ton Thomas-type converter, 3-ton foundry-type converter). The process can be adapted to a wide variety of compositions, from phosphorous to hematite pig-irons, and can also make use of a wide range of lime analyses. The general principles of the operating procedure are outlined, as well as the main metallurgical results, illustrated by an example.

The second process relates more particularly to the open-hearth furnace, and consists of supplying part of the lime required for pig-iron refining by injecting it into the bath, in highly concentrated form, through a jet of pure oxygen. This operation can be carried out by means of lances introduced either through the furnace doors, or through the roof. The lime dissolves easily, and the slag becomes rapidly homogeneous, if the lime concentration is adapted to the evolution of the refining operation. The problem of slopping deserves special attention. It is interesting to note the almost complete elimination of red fumes when a sufficient concentration of lime is reached (about 12 kg. per $Nm^3$). However, many further experiments will be necessary to estimate more precisely the possible time-savings, as the latter depend on many variables, *e.g.*, furnace used, percentage of hot metal in the charge and pig-iron analysis.

The third process concerns partial refining of pig-iron. An oxygen-borne lime-jet first brings about an easy elimination of the silicon, with an appreciable lowering of the phosphorous content. The addition of fluxes to the lime and, when needed, iron oxide, makes it possible to eliminate most of the phosphorus, while keeping the major part of the carbon. The ladle-treatment plant used, on a 4-ton scale, is described, as well as the operating procedure. The results are illustrated by several examples relating to ternary mixes of lime-fluorspar-iron oxide (for instance 95-per cent. dephosphorizing for a 30-per cent. decarburizing). Desulphurizing is also quite extensive. The problem of the unbalanced thermodynamic condition between metal and slag is also outlined.

These three processes show the possibilities of development of pig-iron refining through lime-dust injection in pure oxygen, both in steelmaking and in foundry practice.

## Technical Vocabulary and the International Foundry Dictionary

*By Pierre Huberson (French Exchange Paper)*

Language is the essential instrument for convey-

ing ideas, particularly technical ideas, and the field in which exchange of intellectual information occurs is extremely wide. Without language, there would be no personal communications between men. It is the tool and the basis of commercial relations, transport and customs, Patents, all scientific and technical publications, educational works and standards. The perusal and absorption of this technical literature in various languages poses a problem of standardization of language within the framework of each country, and in the international field. This paper directs attention to the following points:

(1) The relative number of subjects treated and the languages in which scientific and technical publications are written throughout the world.

(2) Evaluation for each country of the number of specialists who are able to read foreign languages, and which languages are concerned.

(3) Various international standardizing organizations have had glossaries of technical terms prepared.

(4) Numerous multi-lingual dictionaries have been published, or are in preparation.

(5) The importance of, and difficulty presented by, the drafting of Patent specifications.

(6) Problems of translation, especially the technical kind.

(7) A solution to the problem of translation has been provided in France by the *Centre Technique des Industries de la Fonderie*. It is explained in detail how foreign publications are read, digested, filed, translated or abstracted and re-published, at the Centre.

(8) A dictionary of foundry terms in eight languages is being prepared under the aegis of the International Committee of Foundry Technical Associations.

(9) The method of working adopted by the French Committee, and by the various International committees.

(10) Importance of the future dictionary, and its field of coverage. This work will be done in such a way that it can easily be extended to other languages.

## High-strength Zinc-base Casting-alloys

*By Alexandre Krupkowski and Wladyslaw Kajoch (Poland) [in French]*

The Zn/Mn/Cu alloys dealt with by the Authors have the physical and chemical properties which place them between commonly used brasses and alloys of zinc and aluminium. They are characterized by the electronic structure of the epsilon phase with the electronic concentration equal to 1.75, and the hexagonal lattice the parameters of which approach the value obtained in the close-packed hexagonal lattice. These alloys have a high strength; for example: in the zinc sand-cast alloy containing 19-per cent. manganese and 15-per cent. copper, the ultimate tensile strength averages 41.3 tons per sq. in., with an elongation of 9 per cent. Some alloys have greater values of elongation, *e.g.* the zinc alloy with 24-per cent. manganese and 14-per cent. copper has an elongation of 19 per cent., the ultimate strength being 36.2 tons per sq. in.

*Alloy Characteristics*

The alloys are characterized by high hardness (160 HB) and good wear resistance, especially in conditions of work without lubrication, exceeding in this respect the properties of brasses. Resistance to surface corrosion is a little higher than that of the Zn/Al alloys. The most harmful impurity in the alloys is carbon, which greatly reduces elongation. Iron has only a small effect on mechanical properties. To protect the molten alloys from oxidation, the addition of a small quantity of aluminium is recommended. The casting properties of these alloys are similar to those of brass, their resistance to heat-cracking means that they can be cast in metal moulds.

## Mass and Physical Properties of Grey Cast-iron

*By Albert de Sy and Jan Van Eeghem (Belgium) Exchange Paper) [in French]*

The problem of the correlation between physical properties and mass of grey-iron castings has held the attention of a great many foundry metallurgists for some time. As a result of recent research work, particularly by Collaud, substantial progress has now been made. The Belgian Foundry Research Centre has studied this correlation problem with Belgian foundries, on a national scale. This work has involved approximately 40 *tonnes* of test-bars and castings, and thousands of mechanical tests. The results of this research are summarized in this Paper.

First of all, the authors deal with the correlation of tensile strength, Brinell hardness and mass in a statistical study, the influence of phosphorus being also taken into account. Also examined is the correlation between mass and transverse-strength characteristics. The validity of Collaud's formula: $\log \sigma t_x = \sigma t_{30} + 1.57 (\log \Delta_x - \log \Delta_{30})$ is also considered. Finally, numerous tensile-strength values obtained from a great many different melts of iron are compared statistically.

## Gases in Cast-iron: Degassing Tests under Vacuum

*By Sergio Gallo and Gino d'Alessandro (Italian Exchange Paper) [in French]*

After considering recent developments in vacuum smelting and vacuum stream degassing in the field of steels, the Authors investigate the possibility of using this new technique with cast-irons. The effects have been studied of degassing grey and malleable cast-irons at different degrees of vacuum, ranging from ambient pressure to 0.5 mm. of Hg (practical limit for vacuum stream degassing). It has been ascertained that, in grey cast-irons, oxygen favours the formation of shrink-holes; while hydrogen and nitrogen, by stabilizing the carbides, cause the formation of hard spots and points, and mottled areas. In cast-irons intended for annealing,

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degassing accelerates remarkably the cementite decomposition process. The slowing down of the graphitization process in cast-iron smelted in air must be attributed to hydrogen and nitrogen, the effect of oxygen being negligible. For all types of cast-iron, high percentages of gaseous elements cause interdendritic microporosity and blowholes in castings. These flaws may be eliminated, however, by degassing.

## Peripheral Blowholes in Cast Steel

*By Josef Pribyl and Ondrej Starosta (Czechoslovakia) [in German]*

For the last twenty years steel firms in Czechoslovakia have been trying to eliminate peripheral blowholes, but they were not successful until recently. The reason for this continued unreliability was that no difference between peripheral blowholes and "effervescence blisters" had been established. The previous opinions on peripheral blowholes fell into four groups: the most correct of which estimated that the carbon monoxide resulting from the carbon reaction provided the impulse for the production of peripheral blowholes. The great differences betwen peripheral blowholes and effervescence blisters is described in the Paper.

The mechanism of the production of peripheral blowholes is explained on the basis of the energy field of the casting and mould. The lamellar pouring of a thin-walled casting in a green-sand mould with an oxidizing effect gives rise to the production of the transverse concentration gradient-FeO. This is characterized by a FeO ("active" oxygen) content which is considerably higher on the surface than in the interior of the casting. Thus, carbon reaction may take place at the surface and promote the production of peripheral blowholes. The kinetics for the production of peripheral blowholes is characterized by four stages: (1) The decomposition of the water vapour from the mould; (2) oxidation of the molten iron on the surface of the casting; (3) carbon reaction and inoculation of the peripheral blowholes by the CO produced, and (4) diffusion of the gases (hydrogen) in the violent small CO blisters, and their growth to final size. The different thicknesses of the layers of blowholes depends on the FeO concentration, and the different size of the blowholes on the dissolved gas content (hydrogen) of the steel.

*Simultaneous Influences*

The simultaneous influence of the deoxidizing phase in steel, and the effect of the atmosphere and of the green-sand mould may be set out as follows: with any given wall or mould, fully deoxidized steel does not produce either blowholes or peripheral blowholes. A badly deoxidized steel, or much deoxidized subsequently, produces blowholes with any given wall thickness and mould, throughout the whole section, but peripheral blowholes do not appear. With an incomplete degree of deoxidation, or an adequate subsequent oxidation by the oxygen in the air, the FeO content may be staggered, so that neither peripheral blowholes nor blowholes appear in the dry mould; in a green-sand mould peripheral blowholes are frequently produced in thin-walled castings, but rarely in those with thick walls. The reason for this is the transverse concentration gradient FeO obtained by the lamellar pouring of the thin-walled casting, and by the different oxidation effect of the green-sand and dry mould. The appropriate conditions are given in tabular form in the Paper.

Protective measures against peripheral blowholes are based on: prevention of steel contact with any form of moisture after "boiling"; not prolonging the charge after "boiling"; complete deoxidation; avoiding any useless transfer of the steel (in this case the subsequent deoxidation of the steel in small ladles is necessary), and avoiding depression in the runner system during pouring. These measures apply when a mould of oxidizing effect is used (such as a bentonite synthetic mixture).

## Behaviour of Moulding Materials during Shock Heating, in relation to the Occurrence of Scabs

*By H. G. Levelink (Netherlands Exchange Paper) [in German]*

In the first stage of an investigation into the elimination of scabbing, the behaviour of dried clay-bonded sands and of oil-bonded sands during rapid heating in a furnace was studied. A similar inquiry into green moulding-sand had already been previously carried out, and had shown that the expansion phenomena observed play an important part in the formation of scabs and rat-tails.

These phenomena have now been observed with test-pieces which were put suddenly into a furnace at a temperature of 1,400 deg. C. The heated surface of the test-pieces under investigation was flat or arched. The specimens with the arched test-face appeared to have the greatest susceptibility to rapid heating.

During such heating a thin layer of sand, with a thickness of 1 to 4 mm., may be formed on the test-pieces. If a layer of blacking has been applied to the test-pieces, an area is often formed which consists of this layer of blacking with an adhering thin layer of sand, the thickness of which is variable. Such a layer appears to have a tendency to break and deform during heating. The cause of this phenomenon is a bending effect which originates in the layer of blacking, which has a smaller expansion than the layer of sand underneath. It appears that the influence of the layer of blacking on the behaviour of the test-pieces during rapid heating depends considerably on the thickness of this layer; there is a critical thickness at which the layer has the greatest tendency to break and deform. Below a definite thickness, however, the layer of blacking has no appreciable influence.

*Influence of Sand Composition*

With regard to the composition of the sand, the breaking tendency of the layer of dried clay-bonded sand decreases when the sand has a higher moisture

content. This tendency also decreases with the addition of a fine-grained material such as silica flour. The type of bentonite used also has a definite influence. The oil-content of oil-bonded sand with a coating of blacking is very critical. From an investigation of the hot-strength of this sand, it became apparent that this strength may decrease to about one tenth of its original value during an increase in temperature from 20 to 400 deg. C. This big decrease in strength is probably the cause of the small resistance to shock-heating of oil-bonded sand with a moderate oil-content (*i.e.* 1 per cent.) and a coating of blacking. There is an analogy between phenomena which occur during rapid heating of the test-pieces in the furnace, and those which occur during the formation of scabs. In the first place the formation of a layer at the surface of the mould or the test-piece has been ascertained in both cases. Further, the breaking of the layer, which is observed during rapid heating of test-pieces, is also necessary for the formation of a scab. However, as far as the influence of the pressure of the molten metal in the mould on the breaking is concerned, this part of the phenomenon cannot be reproduced in the furnace. Nevertheless, the rapid heating of test-pieces in a furnace allows the tendency of a moulding sand to scab to be estimated in many cases.

## Graphitization of Ductile Cast-iron during Tempering

*By Dr. P. Rys (Czech Exchange) [in German]*

A review of the changes which take place in ductile cast-iron quenched during heating in the temperature range 22 to 710 deg. C. is presented, the greatest attention being given to the secondary graphitization which is produced with extraordinary rapidity in this material. All the studies were carried out on one type only of ductile cast-iron. To determine the influence of structure on secondary graphitization, other types of treatment—austempering, normalizing, deformation, and low-temperature pre-heating—were also applied. The study was principally based on dilatometric investigations carried out with continuous heating, according to Chevenard's differential method, and at constant temperatures in accordance with Bollenrath's adapted absolute method. The dilatometric investigations were systematically controlled by metallographic and X-ray investigations, as well as by hardness and resilience measurements and thermal analyses. On tempering at low temperatures and with normal periods of time, tempering of ductile cast-iron develops as in silicon steels. The high silicon content does not modify the temperature of the first temper phase to any great extent but it does, on the other hand, considerably increase the temperature of the second and third phase of tempering. With these processes, only the third temper phase has a direct influence on the formation of graphite nuclei. Secondary graphitization develops very rapidly when tempering at high temperatures—the production of graphite nuclei has a decisive influence on its development, depending on the condition of the matrix. This condition also affects the graphite growth rate, and it may be modified by various ductile cast-iron treatments prior to the graphitization anneal.

*Structural Defects*

A report is also given on structural defects, both stable and kinetic, and their relationship to the production mechanism for graphite nuclei; this hypothesis, it must be assumed, is, in general, also valid for other graphitization cases. Graphitization is favoured by all types of treatment—quenching, deformation, chill-casting—which give rise to stable defects such as accumulation of dislocations, microcracks and microcavities, and grain and phase limits. To avoid graphitization of iron and steel machine-parts subjected to high-temperature conditions, it is suggested that austempering, instead of toughening, should be adopted. Structural defects also have a decisive influence on both the production of graphite nuclei, and their growth.

## Porosity in Steel Castings

*By Otto Heide (Exchange paper) [in German]*

This work was undertaken to determine the factors which influence porosity in steel castings. Only carbon steels cast in bentonite sands or Croning shells were examined. As test elements, specially-shaped pieces with regular contours were used, thus keeping the influence of the mould constant. A special sampling method was designed, consisting of a quartz cup, with a capacity of 50 gm. of molten steel, which, immediately after filling, was carried under pressure to the mercury charge of a vacuum-chamber. In this kind of hydrogen sampling the greater part of it is precipitated under mercury. As analysis apparatus, a hot-extraction plant prepared for charging 20-mm. dia. steel samples which successively extracted two molten samples at 1,650 deg. C., and an Allino furnace for high-vacuum treatment at 1,200 deg. C. of solid samples, were available. After annealing for one hour, the extraction at 1,200 deg. C. resulted in a practically quantitative elimination of hydrogen.

*Absorption of Hydrogen*

The investigation of absorption of hydrogen by steel in bentonite sand moulds showed that the moisture content of the sand did not influence absorption. Pouring temperature was found to be a factor of decisive influence, however. A correlation was observed between porosity and the final hydrogen content in steel on the one hand, and silicon or silicon-plus-aluminium content on the other. By means of a special refining method which consisted essentially of refining without the addition of coal to the slag, the charging of steel with hydrogen in normal refining times was made possible with the use of air moisture only up to boiling, and hydrogen afterwards. By evaluating test results on the limit values of porosity, and the absorption of hydrogen by the steel in terms of pouring temperature, the porosity-free castability limits were determined for carbon steels of different deoxidation rates.

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## Vacuum-casting of Grey Iron

*By Otto Necas and Robert Kamensky (Czechoslovakia) [in German]*

This paper deals with research on vacuum-casting of grey cast-iron, undertaken by the Research Institute of the Vitkovice Steel Works, Klement Gottwald National Corporation. Grey cast-iron with the usual chemical composition was melted in a high-frequency furnace, and was cast at about 1,220 deg. C. in such a way that half the charge was under vacuum, the other half being poured under normal conditions for the sake of comparison. The chemical composition of the vacuum-treated cast-iron remained unchanged, except for sulphur, which was reduced in most cases by about 10 per cent. Gas content was reduced considerably: hydrogen by 49, oxygen by 21, and nitrogen by 42 per cent. The gas analyses were obtained by the chromatographical method (vacuum extraction from the molten metal in a high-frequency heating apparatus). Regarding the influence of vacuum-casting on properties of casting, it has been ascertained that the tensile strength of grey cast-iron decreases by about 20 per cent., and its hardness by about 13 per cent. This unfavourable influence upon mechanical properties is due to a change in the microstructure of the iron.

Vacuum-treated castings have more ferrite and under-cooled graphite than usual. However, there are no differences in the macrostructure. The relationship between the mechanical properties of grey cast-iron and its structure was also studied —by means of the transverse-testing apparatus which enables one to watch the plastic deformation of metals directly on polished specimens under a microscope. It has been found that fracture cracks in vacuum-treated castings run mainly through areas with undercooled graphite, and occur even with low stress. In specimens taken from ordinary castings, where the graphite was distributed more regularly, these cracks ran through the middle or along the boundaries of the graphite lamellae.

## Solidification and Crystallization in the Manufacture of Steel Castings

*By Bernhard Matuschka (Austria) [in German]*

The development of the solidification processes in iron, the crystallization processes and formation of casting structures, and progressive freezing after pouring, are first dealt with. Then, solidification shrinkage and solid contraction of unalloyed and alloy steels, and shrinkage in steel sand-castings as compared with steel die-castings, are considered. Shrinkage displacement, ferrodynamic processes and effects, and the tendency of steel to piping come next, followed by a description of the Tatur truncated cone test for investigating pipe shape. The next section of the paper deals with: gross shrinkage defects, scattered shrinkage, removal of steel castings from moulds, microshrinkage, discontinuities in crystallization and solidification cavities, and spontaneous crystallization and crystal dross. Finally, the destruction of cast structure and anneal homogenization, and the influence of weak spots in crystal-grain boundaries on strength properties of cast steel, are commented upon.

## Effect of Free and Combined Magnesium on Formation of Graphite in Cast-iron

*By D. Pohl, E. Ross, and E. Scheil (Germany) [in German]*

A method of distinguishing combined magnesium from free magnesium was developed. As an equilibrium is established during pouring, a somewhat arbitrary but clearly suitable value was used, since the real value can be obtained only by means of a careful kinetic study. The measurements were correlated with measurements of surface stress, and microscopic investigations. The influence of the magnesium addition on surface stress is based, up to a maximum, on the reduction of sulphur content. The formation of spherulites does not occur until free magnesium is present together with combined magnesium. Some tests were also carried out with disturbing elements. Besides those already known, phosphorus and magnesium were found to be weak disturbing elements. Magnesium is necessary for the formation of nodular graphite. It does not, however, accumulate with the graphite, but remains mainly in the matrix.

## Solidification of Centrifugally-cast Pipe

*By Heinrich A. Nipper (Germany) [in German]*

The many factors which influence the solidification process in centrifugally-cast iron pipe are considered. Three different main groups of influencing factors are established, namely: those affecting the behaviour of iron, those produced by the ingot mould, and those depending on the different work methods in each case. A detailed description of the De Lavaud method is given, with many graphs of the faulty conditions which occasionally appear. Reference is made to the significance of the rate of flow of iron into the mould, and its subsequent acceleration and distribution, in the production of sound pipe.

## Separately-cast Test-pieces in Sand Moulds, for Copper Alloys

*By Z. Gorny and A. Fijal (Poland) [in German]*

Since separately-cast test-pieces may be defective in the same way as normal castings, casting them properly becomes important. Test-bars were cast according to American, British, French, Czechoslovakian and Polish standards. The investigations were carried out in two stages on alloys of the following chemical compositions: Sn 5—Zn 5—Pb 5—Cu bal.; Al 10—Fe 3—Mn 2—Cu bal.; Si 3—Zn 3—Mn 1—Cu bal.; Cu 58—Al 2—Fe 2—Mn 1—Zn bal.; Cu 60—Pb 2—Zn bal., and Cu 80—Si 4—Zn bal. Effect of pouring temperature on tensile was also investigated.

# An American looks at Coalbrookdale

## *Extracts from "The Gilpin Reports"*

In relation to the recent celebrations arising from the quarter-millenium of the Coalbrookdale Company (see JOURNAL October 1 and 22), it is interesting to record some of the impressions gained by a renowned American observer who visited the works during trips to the British Isles between 1795 and 1814. The following extract* is taken from a paper entitled "Joshua Gilpin: An American Manufacturer in England and Wales" presented at the Science Museum, London, on November 4, by Dr. Harold B. Hancock and Dr. Norman B. Wilkinson, before the Newcomen Society . . . which exists "for the study of the history of engineering and technology."

### The Making of Iron

After a section dealing with coal-mining activities in the report of his trips to the British Isles, Gilpin continued by describing the making of iron. This, the Authors refer to in the following terms:

"At Coalbrookdale in Shropshire Gilpin observed how iron and coal complemented one another most perfectly. Through a distant relative, Mark Gilpin, a clerk in the Coalbrookdale Company, he readily obtained access to the works. He was told that the present company was founded about one hundred years earlier by some Bristol businessmen and Abraham Darby. At the time of his visit, the Reynolds family controlled the Mayley Wood works and Ketley of the original estate, and the Darby family operated iron-works at Horsehay and at the original plant.

"Coal, iron and limestone were found in close proximity. In some of the iron strata Gilpin saw fossil forms that interested him. The coal possessed the desirable characteristics of not being sulphurous and not caking. The iron ore was separated from clay or marl and usually roasted in heaps at the spot where it was dug, to free it from impurities. Customary proportions of these three basic substances were seven buckets of ore, one of limestone, and two of coal.

"The furnaces were built of local brick, and some had been in constant blast for 16 years. The furnaces cast upward of two tons twice every 24 hours. When the bottom of the furnaces was full of molten iron, a bell was rung:

> When ye workmen hear the bell each moulder from the various rooms runs with his Ladle of iron to catch a due quantity of metal & takes it to his mould which he fills with it—as a mould is always to be filled at one pouring if one man's ladle will not hold enough at a time a large one is brought carried by two or more persons & if a very large casting, the metal is run into a large pot & both hoisted & carried to the mould by a Crane. After the moulds were filled, the remainder of the metal was run into pigs. Some of the pattern moulds were made of brass and others of hard wood.

"Gilpin was greatly interested in the bellows he saw at Coalbrookdale. These were operated by a water-wheel. The cylinders were 7 ft. in diameter and 4 ft. high. A square valve of leather was in the centre, and the edges were also made of leather. When the bellows were alternately raised and lowered, air was forced into a common pipe and conveyed to the furnace.

"In connection with his account of Coalbrookdale. Gilpin devoted several pages to a description of a machine for boring pipes. He drew an elaborate sketch which he labelled "J. Wilkinson at Bradeley," though it would seem to apply to the operations at Coalbrookdale.

"He attempted to describe the differences in the manufacture of iron by old and by new methods. The furnaces at Horsehay and Coalbrookdale followed the old process, while at Ketley and at J. Wilkinson's newer methods were used."

*Making Iron the Old Way—First*

> The iron ore is burned or calcined by placing it in heaps & firing it with coal for abt [blank] hours—
>
> This is done with all the ore of the Country, but the Lancashire, Cumberland & Westmorland do not require it, nor indeed any pure ore, but that of Shropshire being full of many substances does—the quality of the Shropshire Iron is very different, & it is mixed together—at Coalbrook Dale they make use of none but of the neighbourhood—at Wilkinson's they use those of Lancaster &ca.—
>
> The Coaks & Limestone being all ready—the ore & they are thrown into the Top of the Furnace according to the judgment of the person who attends it—the proportion at Wilkinsons abt. [blank] of Iron to [blank] of Lime & [blank] Coaks.
>
> In the first process the new & old modes agree so as to bring them into Pigs—In the second which is called the refinery the old & new mode differ—
>
> The refinery is built like a common Smith's forge all open—the bellows have two Pipes behind abt. 2 ins. diamt. each which are forced by the Steam engine & send a large body of air thro. The hearth of the furnace or forge is of fire brick abt. 6 to 7 ins. deep & abt. 2½ wide or square—from the bottom of the hearth is a hole or outlet, by which the iron when melted runs out into a square trough in the floor of the house near the forge abt. 4 feet by 2 feet & 6 in. deep—this is the mode in which the forge is made for the new process & old tho in the old the square Trough in the floor is unnecessary but the furnace may be made as a Smiths usually is—

*Second Process, Old mode*

> The Pigs are put in the refinery with a sufficient Qty. of Coak & a person to attend them who keeps them covered & stirred about until they weld and concock together in a round lumpy mass without melting. This process is conducted very much according to the experience of ye workmen & is called [blank]. They are now fit for the third process.

* Published by permission of the Newcomen Society.

*An American looks at Coalbrookdale*

*Third Process*

> The above concocted or welded Mass of Iron is taken out & rolled, beaten by hammers—to weigh Plates abt. 1 inch thick—It is then broken by Sledge hammers, & the pieces put into Pots or Sackers or on Tile made of Stourbridge Iron & in this state put into the bloomery ovens or furnaces which are made air furnaces for the heat to pass over, but the Coal not to get among them. Here they are kept till welded or heated together again, when they are taken out by iron tongs & put under the forge hammer where they are beaten into pieces abt. 2 feet long & 2½ inches square—they are then heated again & beaten or rolled out into barrs of a rough thick form—then heated again & beaten or rolled out into compleat Barrs or such width & thickness as the uses for which they are wanted require—

The extracts from Gilpin's reports continue with sections on new modes of making bar iron, copper manufacture, lead-shot production and conclude with an account of pin making.

**The Gilpin Journals**

In the earlier part of their paper, the Authors refer to the source of their information, namely, "The Gilpin Journals" and explain that papermaking was one of the early industries of major importance in the State of Delaware, USA. When research in this subject was begun in 1954, preparatory to the construction of an appropriate exhibit in the Hagley Museum of Early American Industries, attention was called to some 62 journals written by Joshua Gilpin that were in the Pennsylvania State Archives in Harrisburg. Gilpin, with other members of his family, began Delaware's first paper mill in 1787 and operated it until 1837.

Examination of the journals disclosed that they were written while Joshua Gilpin was visiting the British Isles and the Continent on two trips, one covering the years 1795 to 1801, and the other from 1811 to 1814. The journals show that Gilpin was a tireless recorder of all he saw. His interests were catholic but particular attention was given to the many burgeoning industries and their technological methods of the late 1790s, as well as to the commercial life of the times. The Gilpin family also conducted a thriving commission merchant business in Philadelphia, then the capital of the United States.

*First American Papermaking Machine*

Gilpin came from an English Quaker family that had migrated to America in the 1690s and had prospered in Philadelphia as merchants. Encouraged by Benjamin Franklin, Joshua, and his uncle Miers Fisher had begun the manufacture of paper in 1787 in a mill along Brandywine Creek near Wilmington, Delaware. Here in 1817, a younger brother of Joshua's, Thomas Gilpin, using the information about John Dickinson's endless papermaking machine acquired by Joshua while in England, "invented" the first successful American papermaking machine. Along with their paper mills, the Gilpins at various times also operated cotton and woollen mills on the Brandywine, conducted a commission business in Philadelphia, and invested in western Pennsylvania lands.

Although his formal instruction had ended with grammar school, Joshua Gilpin continued to educate himself through wide reading, observation and travel. His library contained books on philosophy, chemistry, geology, history, and works of English literature. Indeed, he fancied himself something of a literary man, privately publishing a book of verse and an essay on the Delaware and Chesapeake Canal, an improvement largely promoted by the Gilpin family. In the spirit of his time, he apparently sought to become a "universal" man: one who knew something about everything and had travelled widely. This latter ambition was realized by the two "grand tours" of England and the Continent which he made, from 1795 to 1801 and again from 1811 through 1814. He returned to Delaware from his first tour in 1801 accompanied by his English wife, Mary Dilworth, daughter of a Lancaster banker. Stowed away in his portmanteau were scores of small memoranda volumes packed full with his observations and comments on things foreign.

## Powell Duffryn Engineering acquires Pipeweld

Whole of the share capital of Pipeweld, Limited, Manchester, has been acquired by the Powell Duffryn Engineering Company, Limited. The acquisition will enable Powell Duffryn Engineering to undertake, as an integrated project, comprehensive installations involving not only the storage tanks and vessels, but also all the associated pipework and long-distance pipelines.

The directors of Pipeweld are:—Mr. D. G. Badham (chairman); Mr. G. Basil Jones (managing director); Mr. E. H. Jerrett, and Mr. W. P. Warren.

Powell Duffryn, Limited, also announces that a new subsidiary of Powell Duffryn Engineering has been formed under the title of P.D. Equipment, Limited. The new company will be concerned with the marketing of shop-fitting equipment and certain other products.

**Colvilles Final Dividend**

Final dividend of 8 per cent., as before, by Colvilles, Limited, the Scottish steelmakers, makes a 14 per cent. total for the year ended September 30, 1959, an increase of 1 per cent. The company's consolidated profits rose from £11,152,075 to £11,813,912.

After depreciation of £2,462,004 (£2,500,191), tax of £3,676,817 (£4,437,034), and £2,000,000 (same) to general capital reserve, the net profit of £3,675,091 compares with £2,214,850. Sir Andrew McCance is chairman of the company.

The directors state that the recession during the latter half of the previous year continued during the opening month of this year, but a recovery in demand started in the light products and is spreading to heavy material. All present indications point to an increasing pressure of demand for all classes of steel.

## Recent Research Work

The October issue of the *Journal of Research and Development* of the British Cast Iron Research Association contains a Report from Mr. J. V. Dawson on "Pinholing and Hydrogen Pick-up in Malleable Cast Iron." The Author summarizes the results of his work in the following statement:—

The major fact emerging from the experiments undertaken is the danger of producing pinhole defects by adding aluminium to malleable iron. This risk is even more pronounced if aluminium is added to high-manganese pearlitic material. In the absence of aluminium, the hydrogen pick-up increases with increasing manganese content and this is independent of the sulphur content of the base material. When aluminium is added to metal with a low sulphur-content, the hydrogen pick-up is less than when added to high-sulphur material. When boron is added to high-sulphur metal with high or low manganese-contents, no significant increase in hydrogen pick-up occurs. It has long been the practice to add a small amount of aluminium to malleable cast-iron to improve its annealing properties. While large numbers of cases must exist where no trouble from pinholing is experienced, the increased hydrogen pick-up due to this aluminium is always a potential source of trouble. An increase in aluminium addition, which is made for any reason, is likely to result in an outbreak of pinholing; there are, in fact, records of industrial cases of this occurring in normal blackheart compositions.

### Addition of Manganese

The production of pearlitic-malleable iron is sometimes achieved by ladle additions of manganese to a normal blackheart material. This addition of manganese produces a considerable increase in hydrogen pick-up, but no pinhole defects have been found due to this hydrogen pick-up. However, when the usual addition of aluminium is made as well, the hydrogen pick-up reaches extremely high levels and severe pinholing is the result. Again this problem has been met in the field. It is interesting to note that the pick-up due to aluminium is much greater when the sulphur content is high. It is not a practical proposition, for a number of reasons, to reduce the sulphur content of malleable iron to a very low level. On the other hand, any unnecessary rise in sulphur content may lead to an apparently inexplicable crop of hydrogen defects.

Obviously the surest way of avoiding any possibility of the defects occurring is to eliminate the addition of aluminium completely. Failing this, the addition must be kept to an absolute minimum which can only be found by experience in each plant. If this minimum be too low to confer the required annealing properties, then the addition of ferro-boron must be considered. This addition will give good annealing properties without any increase in hydrogen pick-up. It is impossible to give the amount of boron addition which will be equivalent to a specific aluminium addition and each case has to be considered on its own merits. If, when all points have been considered, a case should arise when the addition of aluminium is necessary, then experience has shown that some reduction in hydrogen pick-up can be achieved by adding the aluminium some minutes before casting. For instance, if a large service ladle is used to feed a series of casting ladles, then adding the aluminium to the service ladle can give a lower pick-up than if an equivalent amount was added to each casting ladle. The reason for this is obscure and careful chemical analysis has failed to reveal any change in total aluminium content, or the manner in which it is combined, in relation to the method of addition.

Some evidence is also available which suggests that the use of a synthetic sand with a low moisture-content and high permeability gives less hydrogen pick-up, and therefore fewer defects, than a natural sand with more moisture and low permeability. However, the reduction in hydrogen pick-up arising from either of these suggestions is small compared with that of omitting the aluminium completely.

A second Report in the *Journal* is by Mr. A. G. Fuller, M.SC., on "Sinking under Bosses on Thin Plates," and he has drawn the following conclusions from his research:—(1) When using irons of the degrees of nucleation and compositions set out in the report, sinking is at a minimum when the pouring temperature is within the range 1,280 to 1,330 deg. C. (2) The depth of sinking is increased as the pouring temperature is either increased above or decreased below this range. The magnitude of the effect depends upon the design of the casting. (3) The effect of pouring-temperature upon sinking is believed to be governed at low pouring-temperatures by the number of eutectic cells growing and at high pouring-temperatures by mould variables. (4) Increasing the furnace temperature and the furnace holding-time will decrease sinking and the degree of eutectic nucleation of the melt.

## *New Patents*

*(Copies of complete specifications are obtainable from the Patent Office, Sales Branch, 25, Southampton Buildings, Chancery Lane, London, W.C.2, price 3s. 6d.)*

**810,030** D. M. Morgenstern, 21111 Edgecliffe Boulevard, Euclid, Ohio, USA.

Improvements in methods of die-casting under vacuum, which the inventor claims give a reduction in the percentage of rejects encountered in a given batch of castings. (See also B.P. 780,126, FOUNDRY TRADE JOURNAL, November 7, 1957.)

**810,294** J. B. Brennan, 13018 Lake Shore Boulevard, Cleveland, 8, Ohio, USA.

This Patent provides for a method of casting in which a mould is moved with respect to a molten metal supply source, and is charged at successively higher level of the mould cavity, each charge flowing upwardly into that cavity.

**810,357** Morris Beam & Company, Yellow Springs, Ohio, USA.

A novel method of casting ductile iron is claimed in this Patent. The iron is cast against a mould member having a desired surface configuration. In this mould is a layer of refractory heat-insulation material (*e.g.*, hollow glass spherules) which forms a thermal barrier adjacent to the portion or portions of the article or articles which are of thin section and are to be ductile as cast.

**810,442** Doittau Produits Metallurgie, Les Tarterets, Corbeil, Seine et Oise, France.

This invention provides for a lining for a feed head of an ingot or other metal casting mould. This lining consists of a number of shaped fabricated elements, each comprising a layer of exothermic product and a layer of a heat-insulating material (such as agglomerated moulding sand) which faces the interior of the mould for the purpose of delaying combustion of the exothermic product until the metal in the mould begins to solidify. (See also B.P. 808,839.)

B. ELLIOTT & COMPANY, LIMITED—Mr. C. H. Frye has resigned his directorships in the group due to ill health.

D

# Equipment and Supplies

## Airtube Sample-carrier

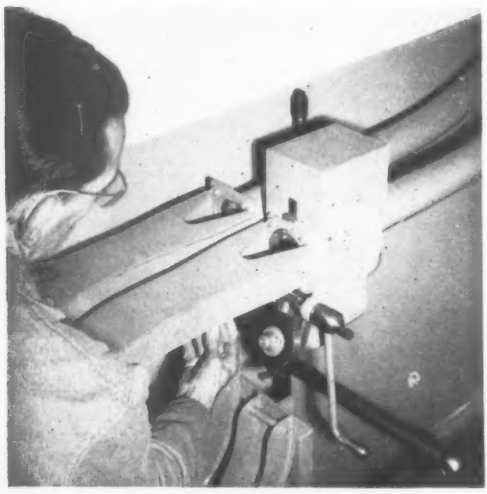
A new airtube system, designed to carry metal samples at high speeds between furnace and analytical laboratory, has been introduced by Lamson Engineering Company, Limited, Hythe Road, London, N.W.10. The system is operated by compressed air, and can carry samples weighing 4 lb. at high temperatures, at speeds of 40 to 50 m.p.h. High-speed analysis of samples in the course of a melt is of great importance in modern foundry production, since the time spent in transferring the sample from furnace to laboratory may effect the rate of production. Furthermore, the handling of samples while still hot can have distinct advantages. The carrier in which the sample is conveyed measures internally 2-in. dia. by 4-in. long. The head is in the form of a sleeve fitting over the carrier, and the tubing in which it travels is 3-in. dia. and can be laid underground, overhead, or inside ducts. When the carrier is inserted in the end of the tube (Fig. 1) a door is shut, automatically operating an air-valve which admits compressed air for a predetermined period to propel the carrier to the receiving end. Normally, only one tube is needed with carriers passing in both directions. Where traffic is heavy, however, a two-way system can be installed, using each tube for one direction only. This system has been extensively tested by one of the big steel manufacturers, and it has been discovered that a distance of 1,250 ft. between furnace and laboratory can be traversed in 17 sec., at over 40 m.p.h.

## Gravity-die-casting Machine

A simple die-casting machine (Fig. 2) which employs inexpensive dies and, it is claimed, can be operated without previous die-casting experience, has been introduced by the foundry division of Electric Resistance Furnace Company, Limited, Netherby, Queens Road, Weybridge, Surrey. It has been designed to reduce both the capital and running costs of producing iron and light-metal castings which do not need to be made to very close dimensional tolerances. The machine has a two-way cylinder for closing and clamping the dies and requires only a supply of compressed air for its operation. The die-heating and -cooling arrangements of conventional die-casting machines are not required; dies are made in a grade of Meehanite metal to withstand thermal shock and the machine is used in banks of sufficient numbers to allow time for natural cooling. For making iron castings weighing about 3 lb., the dies require a cooling time of about 4 min. In this time two operators, one pouring and the other removing the castings, could, it is stated, tend 15 machines and produce 225 castings per hour.

Dies are designed by EFCO from customers' drawings and supplied ready for insertion into the casting machine. They are made by the "true-to-form" as-cast technique at a relatively modest cost. The machine has an overall length of 3 ft. 10 in., is 9 in. wide and stands at a convenient height for pouring. It will accommodate dies up to 10 by 8 in. in face area. A bank of five machines—with gangways and stillage or bogie room—occupies a floor space of approximately 8 sq. ft.

FIG. 1.—*A carrier being inserted into the airtube sample-carrier introduced by Lamson Engineering Company, Limited, of London.*



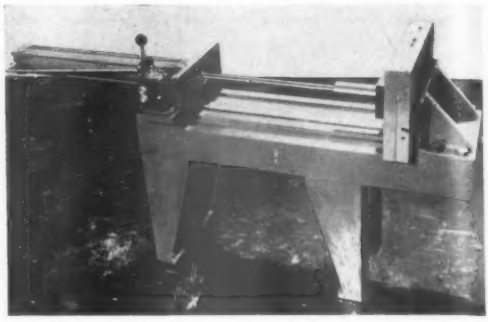


FIG. 2.—*EFCO gravity-die-casting machine, with the die closed ready for pouring.*

## High-temperature Ammonia Dissociators

For some years, the use of 75 per cent. hydrogen/25 per cent. nitrogen mixtures (derived from "cracked" ammonia) has grown steadily. More recently the high-temperature type of cracker has increased in popularity as it obviates the necessity of water scrubbing to remove residual ammonia. Using a specially developed catalyst, high-temperature ammonia crackers are now being produced by the gas-atmospheres division of the Incandescent Heat Company, Limited, Smethwick, Staffs, to the design of the Drever Company, Bethayres, USA. These plants have outputs from 150 to 5,000 standard cub. ft. per hr. and are produced in ten standard sizes. High-temperature cracked ammonia is used in the heat-treatment of metals, sintering, welding, controlled nitriding, degassing of metal baths and in metal cleaning by the sodium hydride process.

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**Braked Motors:** Newman Industries, Limited, of Yate, Bristol, who introduced recently a complete range of electric motors incorporating a disc-type electromagnetic brake, announce that they have increased this new range from fractional to 15 h.p. up to fractional to 40 h.p. (3,000 r.p.m.).

# American Letter

## Continuous Carbon Injection*

In the carbon-injection process, fine particles of graphite or other carbonaceous material, carried by a stream of relatively inert gas such as nitrogen, enter the melt through a graphite tube or lance immersed in the molten metal. The carbon particles are delivered to a point below the surface of the melt where they are readily dissolved—in this way high recoveries are obtained. The equipment and general technique used are similar to those required for desulphurizing by the injection of calcium carbide, lime or aluminium-magnesium alloys. Basically, the dispensing equipment consists of a pressure vessel, mixing assembly and delivery system. At the low feed rates of two to three lb. per min. used in the authors' investigation the hose can cause blockage, and stop the flow of graphite. The injection lances were graphite "fluxing tubes," with 2-in. outer dia., ½-in. inner dia., and a length of 9 ft. Electric-furnace graphite was used, of the following approximate sieve analysis: 5 per cent. retained on a 10-mesh, 80 per cent. on a 65-mesh, and 15 per cent. on a 100-mesh screen.

*Continuous Operation*

The main object of these tests was to determine whether the dispenser was capable of continuous operation at a feed rate of two to three lb. of graphite per min. A secondary objective was to find a solution to the problem of lance erosion and blockage. A sketch of the complete test apparatus is shown in Fig. 1. These tests showed that the dispensing equipment could be operated at feed rates as low as 1.75 lb. per min. for an indefinite period. The only interruptions were due to lance erosion and blockages, which occurred at 15- to 20-min. intervals. At first two lances were used, changing after every blockage, a new lance being inserted while the blocked portion of the first lance was removed so that it could be put back in service after the second lance failed or became blocked. A further objective of the tests was to solve the problem of lance failures and blockages, and once this was done, to determine suitable dispenser settings for a consistent carbon increase from 3.30 per cent. to 3.65 per cent. It was eventually discovered, after further work, that the problem of lance failures and blockages could be solved by immersing the lance in the melt at an angle of about 45 deg. Many minor problems of operation were encountered. For example, moisture entering the dispenser is absorbed by the graphite, and causes blockages at or near the feed valve. Methods were developed to blow out such moisture.

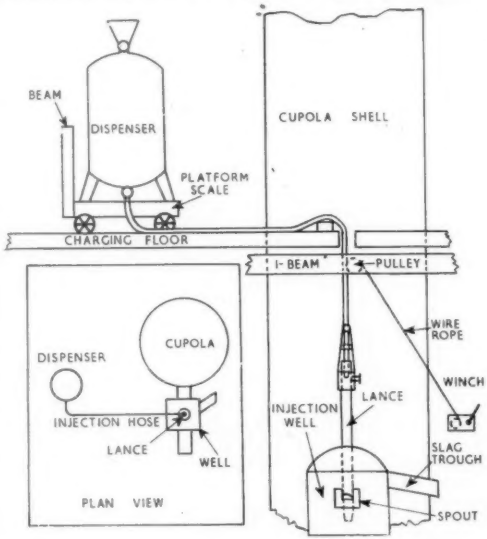


FIG. 1.—*Layout of the apparatus for testing continuous carbon injection, etc.*

*Carbon Control*

For a given initial carbon content, the control of final carbon depends on (*a*) feed rate, and (*b*) carbon recovery. The feed rate depends primarily on the tank pressure and flowrator settings. Carbon recovery depends on the percentage of carbon in the powder, the immersion depth and the chemical composition of the metal before treatment. It was found that the fluctuations in metal temperature at the forehearth did not cause any appreciable variation in carbon recovery. It was also discovered that an average immersion depth of 18 in., with a maximum variation of ±4 in., resulted in quite uniform values for carbon pick-up, and good control of the final carbon content. Close control of carbon content has been achieved by the authors during regular plant operation with carbon injection, the average variation in carbon contents for 20 successive eight-hr. shifts being 0.18 per cent. At present, the limiting factor in application of carbon injection is the increase in sulphur content as the pig-iron charge is decreased. It was determined that a saving of about 10 per cent. per ton charged could be realized with a final carbon content of about 3.60 to 3.70 per cent., with simultaneous desulphurization.

* From work done by J. E. Wilson (project leader), and F. C. Shnay (manager), of the research and development division, Canada Iron Foundries, Limited, Toronto, Canada.

## AIME Electric-furnace Programme

A meeting of the electric furnace committee of the iron and steel division of the metallurgical society of the American Institute of Mining, Metallurgical, and Petroleum Engineers was held at the Cleveland Hotel, Cleveland, from December 2 to 4. Three technical sessions on melting and pouring practice for steel castings were included in the programme.

*Quality Control:* The effect of various deoxidizers on cast steel; the joint effect of sulphur and rare-earth metals on the mechanical properties of a cast complex low-alloy electric-furnace steel, and melting practice to produce extra low-sulphur carbon, were dealt with in the first session.

*Degassing:* In the second session, gas solubility of iron and nickel-base alloys, ladle-to-ladle stream degassing, vacuum degassing of steels for aircraft uses, and foundry vacuum equipment, were considered.

*Refractories and Gadgets:* The third session dealt mainly with phosphate-bonded refractories for pouring-ladle spouts; high-alumina castable refractories for ladles, and gadgets and tricks used in foundry melting.

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ELECTRO METHODS, LIMITED, announce the removal of their electrical connector division to new premises at Hitchen Street, Biggleswade, Beds. ('phone: Biggleswade 2086). The division manager is Mr. D. P. Wright.

# Notes from the Branches

## Slough Section

During November, in the Lecture Theatre, High Duty Alloys, Limited, Slough section members of the Institute of British Foundrymen attended a meeting which was somewhat unorthodox in the choice of subject. Instead of listening to a paper on some technical aspect of the foundry industry, members were given a travel talk by Mr. A. R. Parkes with the title: " My Hungarian Tour." This meeting was also notable in that it was chosen by the London branch for the annual liaison visit by official delegates. The chairman at the meeting was Mr. H. J. Proffitt who, as vice-president, was deputizing for the section president, Mr. S. J. Williams, who was absent due to illness—those present wished him a very speedy return to full health.

Before calling on the lecturer, Mr. Proffitt welcomed Mr. J. Bain (London branch president) and his party from the parent organization. Mr. Bain said how pleased he was to be able to visit all the sections during his term of office; he felt that such visits did much to help the largest branch of the Institute to be the happiest. If he had the time to visit all the sections for both technical and social activities, he would have a very busy winter programme, but Mr. Bain said he felt sure that the effort would be well worthwhile. Mr. Proffitt then introduced Mr. Parkes, saying it was really superfluous to do so, as probably everyone present knew Mr. Parkes was a past-president of the section and both honorary secretary and junior vice-president of the London branch.

Mr. Parkes commenced his talk by explaining exactly how his Hungarian trip had come about. It was undertaken, he said, to deliver a paper sponsored by the IBF to the first Congress of the Hungarian Foundrymen's Association (a section of the Hungarian Metallurgical and Mining Institute). The paper he was nominated to prepare was entitled " Organization and Scope of the UK Foundry Industry," and he acknowledged gratefully the backing he had received from directors and colleagues of the FOUNDRY TRADE JOURNAL that had enabled him to visit Hungary to present the paper in person.

Mr. Parkes' colour transparencies and black-and-white pictures were of excellent quality and with their aid, he took his audience from London Airport to Hungary, *via* Brussels, took them on sightseeing tours of Budapest and its surrounding district, on visits to foundries and technical institutions inspected during the Congress, and then returned them to London, pausing at Vienna *en route*. The commentary, whilst touching on some of the outstanding technical points that the speaker had noted during the works visits and taken from the papers presented, consisted mainly of his impressions of the Hungarian way of life and how things differed from what is customary in England. It was very interesting to hear that Mr. Parkes was the only UK representative among the 300 or so delegates at the Congress (these being mostly from Eastern European countries in addition to considerable numbers of Hungarian foundrymen). He had been given a personal interpreter to assist him at every function attended during his stay, and this service was all the more valuable because the person chosen had an intimate knowledge of foundry practice. He was very impressed by the friendship and hospitality shown to him at all times while the guest of the Hungarians, the more so because it conveyed the feeling that British nationals generally and British founders in particular were well esteemed in Hungary and enjoyed a high reputation there.

After the talk, members were very eager to learn more and many questions were put to Mr. Parkes, some bearing on the Hungarian way of life being a little too complex for him to answer alone. Fortunately, he had invited a Hungarian friend to the meeting who was able to fill in the outlines. It was made clear that Hungarian foundrymen are working on about the same lines as those in other countries and much of what they lacked in modern high-production plant they were making up for by hard work and exercise of native ingenuity.

The meeting was closed by a vote of thanks to Mr. Parkes (and his Hungarian friend), proposed by Mr. J. P. P. Jones, who said it had proved a delightful evening; Mr. J. Wood seconded and the assembly warmly supported the proposition.

## Lancashire

The December meeting of the Lancashire branch of the Institute was held at the Midland Hotel, Manchester, when Mr. H. Blackburn presented a paper on " Patternmaking for Jobbing and Mechanized Foundries," and made use of colour slides to illustrate his paper. The lecturer first outlined the techniques which he himself used, and then went on to assess the present trends in the patternmaking industry, with special reference to the use of resin patterns.

### Discussion

From the discussion which followed, members learnt from Mr. Blackburn's replies that silicone oil, diluted, could be used as a release agent if sticking was encountered in stripping the plaster from wooden master-patterns; if, however, resins were cold-cured sticking should not occur. There was not usually any exothermic action with small epoxy resins when using a plaster mould, but PVA on top of wax could be tried to prevent sticking. It was necessary to wear gloves when making patterns, but there was not usually any risk of dermatitis from epoxy resins; there might be with polyesters, Mr. Blackburn thought. The patterns had a " gel " coat, and were laminated with fibreglass for strength; laminated patterns were more expensive. Laminations on polyesters had been tried, but stability and dimensional accuracy could not be guaranteed. As to the relative costs of resin and aluminium patterns, if a master was used there would be little or no difference. An experienced operator, he said, could make large patterns in epoxy resin, but with these exothermic reactions were sometimes encountered and, here again, experience would help. Referring to a wooden pattern he had shown in one of his slides, Mr. Blackburn said this had been rammed direct by slinging and added that no cambers were put in patterns by the patternmaker.

One member said he thought that more taper should be put into patterns and coreboxes when made from resin, and that he was of the opinion that iron patterns could not be beaten. He was interested to know why a fibreglass corebox had been made to produce a cylindrical core, when a " sausage " machine could have made the same core without any box at all. In reply, Mr. Blackburn said he agreed that more taper in patterns was desirable, and that a metal tube could have been used instead of fibreglass for the corebox. However, he thought that the type of foundry determined choice of what materials were used. The discussion was concluded with Mr. Blackburn saying that the advantages of using epoxy-resin patterns were that they were lighter in weight than other patterns, they would strip more easily, and duplication and repair was simpler. The meeting closed with a vote of thanks

being proposed to Mr. Blackburn by the branch president, Mr. C. M. G. Wallwork.

## *South Africa*

"Electric-arc Melting Practice" was the subject of the lecture presented by Mr. J. H. Martin, to the November meeting of the South African branch under the chairmanship of Mr. K. H. Coombs.

Mr. Martin dealt respectively with the linings, charge, melting and fettling. The actual hearth of the acid-lined furnace, he said, consisted of pure silica sand with a bond or a ready-mixed hearth material as supplied by refractory manufacturers, and both required approximately 5 per cent. moisture for ramming. Depending on the capacity of the furnace, there would be one or two courses of silica brick on the bottom and side walls, making a nine or 13-in. thickness. After hand charging with coke, he went on, the temperature would be brought up slowly to prevent any spalling during the critical temperature range of silica, *i.e.* atmospheric, to 400 deg. C. This period could be considerably shortened by preheating the roof over an open fire, while lining the body of the furnace. From 400 deg. C. the burning-in could be slightly accelerated until eventually the hearth was sintered, particular care being not to let the roof drip. The first heat should be a small wash heat to clean the furnace as it was likely that there would be a sulphur and phosphorus pick-up from the residual coke in the furnace.

*Basic Lining*

The basic lining of the furnace would have one to two courses magnesite on the bottom and side walls, continued in magnesite with backing brick to two courses above the slag line, the remainder being Cr.Mag. The hearth lining could be either tar dolomite or monolithic Crespi. Of the two, the Crespi lining was the superior and was quicker to instal as ramming time would be shorter and production could begin upon removal of the formers. The furnace would be hand charged to sill level and switched in immediately.

*Charging*

Mr. Martin stressed that when charging acid- or basic-lined furnaces it was important to ensure that the heaviest scrap was charged on the bottom of the hearth, followed by progressively lighter scrap until completely charged. When the electrodes bore through the scrap it was essential that there should be sufficient liquid on the bottom of the hearth to protect it from the actual arc. For ideal melting conditions the initial charge should have sufficient carbon content to induce a vigorous boil to eliminate gases.

*Melting*

The normal melting process of the acid was not as complex as the basic process, the author continued. After melting, the metal would be brought to a vigorous boil as quickly as possible, and when the carbon was just below required specification, metal temperature and composition would be adjusted; followed by complete deoxidation and tapping. Basic melting, however, was more involved as all sulphur and phosphorus must be eliminated by boiling and slagging. Before charging, approximately one to 1½ per cent. limestone of the charged weight is charged on the hearth and with the highly-basic slag formed at the beginning of the melt, the phosphorus removal began almost immediately.

*Fettling*

The most vulnerable points in the hearth wear, said Mr. Martin, were the drainage, slag line, and directly beneath the electrodes, and if possible, the hearth should always be drained dry after each tap for fettling. Dead burnt dolomite for heavy fettling should not be coarse and should have plenty of fines.

## *Beds & Herts Section*

The meeting of the Bedfordshire and Hertfordshire section, held on December 10 at K. & L. Steelfounders & Engineers, Limited, Letchworth, took the form of a liaison meeting with members from the parent organization—some six members making the trip to Letchworth. The speaker at the evening's meeting was Mr. T. C. Wilson (of J. Blakeborough & Sons, Limited) who took for his subject "Mould and Core Production by the $CO_2$ Process."

In his lecture, Mr. Wilson described the development of the $CO_2$ Process for moulds and cores and detailed how the Process was applied to mechanized coremaking, heavy cores, light and heavy moulding. He gave details of the sand mixes and detailed the effects of the various additives used. Blacking and gassing methods, equipment and its application to a variety of moulds were shown by a number of examples. Also included was a summary of practical and economic advantages of the Process, and details of labour analyses and material costs were given.

From the points the author made, some of the following were brought up for further discussion:—On utilization of the Process, Mr. Wilson confirmed that present consumption of sodium-silicate was about 4,000 tons per year for foundry purposes, he himself used about 15 tons per week. He incorporated about 30 per cent. reclaimed sand in his mixtures, having recently installed a plant for extracting such material from the knock-out, he said. For difficult pockets in large castings, the author stressed the value of zircon sand to prevent burning-on; he also discussed the use of perforated-rubber gassing tubes and perforated steel tubes and assemblies of tubes, the latter serving the dual purpose of mould or core reinforcement. Sometimes, he said, intentional over-gassing of the centre of a large core could be used to assist subsequent breakdown. After having operated the process for five years, his firm had saved over 10s. per ton of castings in raw materials, up to 36s. per ton in labour charges, on certain jobs, and there had been an overall increase in productivity of 8 per cent.—all savings which partly offset some of the other increases foundrymen had had to contend with in recent years. When asked how much gas was needed for different jobs, Mr. Wilson replied that experience was the sole guide. He had had no trouble with dermatitis or reluctance of operators to use the process; on the contrary, he had found that once his staff had appreciated that here was a new labour-saving and clean technique, they had been very anxious fully to explore its possibilities. He now had about two miles of plastics pipelines in his shops delivering the carbon-dioxide to moulding and coremaking stations.

Mr. G. A. Smith (K. & L. Steelfounders & Engineers, Limited), voiced the meeting's vote of thanks to the lecturer—and himself received, in turn, thanks directed to his firm for the provision of light refreshments served during the proceedings. Finally, before the meeting was closed, on the invitation of the section president, Mr. F. C. Baker, who was in the chair, Mr. D. A. C. Hutchison (branch senior vice-president), who lead the delegation from London, expressed the branch's pride in the way the section's affairs were being conducted and his sense of privilege in attending such a worthwhile meeting.

# Company News

WEBLEY & SCOTT, LIMITED, engineers and machinists, of Birmingham—The offer by Arusha Industries, Limited, to purchase the company's ordinary shares has been extended for acceptance until the expiration of two weeks after the publication of the next group accounts of Arusha.

ASSOCIATED ENGINEERING HOLDINGS, LIMITED—The dividend is to be increased to 17½ (13⅓ equivalent) per cent. for the year to September 30, 1959, with a final of 12½ per cent. on a capital raised to £5,178,005 by a one-for-two scrip issue. Net profit increased to £1,523,506 (£1,231,433).

COCHRAN & COMPANY, ANNAN, LIMITED, boilermakers and engineers, of Annan, Scotland—Mr. Robert Adeane, the chairman, told last week's meeting in London that a further reduction in the ordinary dividend might be necessary. It was hoped to limit this, however, to a small reduction in the rate of the ordinary stock and possibly only for one year.

BILSTON FOUNDRIES, LIMITED—Mr. T. I. Hobart, the chairman, says in an interim report that trading conditions for the current year have kept up satisfactorily, but, unfortunately, production problems continue to affect activities. Troubles with new plant have restricted output and greatly increased unit costs. Plant modifications are being incorporated as quickly as possible, but the past few months' results will inevitably affect the profits for the year.

R. A. LISTER & COMPANY, LIMITED, agricultural, electrical, and general engineers and ironfounders, of Dursley (Glos)—Group net profit attributable to the company for the year to September 30, 1959, amounts to £587,309 (£487,512) after tax of £595,880 (£586,852). Following the doubling of the interim to 5 per cent., which was intended to reduce the disparity between payments, a final of 9 per cent. is recommended, making a total of 14 (12½) per cent.

WALMSLEY (BURY) GROUP, LIMITED, manufacturers of pulp and paper-making machinery, iron and non-ferrous castings, etc., of Bury—Under the terms of an agreement for the co-operation and exchange of information between the two companies, Beloit Iron Works, US, will subscribe 250,000 new £1 ordinary shares in the group at 110s. a share. Treasury consent has been obtained and permission is being sought from the London Stock Exchange to deal in, and for the quotation of, the new shares.

TUBE INVESTMENTS, LIMITED—At an extra-ordinary meeting last week a resolution was passed excluding the company's aluminium interests from the operation of the borrowing limit clause. Sir Ivan Stedeford, chairman, said that they now had membership in Reynolds Metals, the American company, and it was considered desirable that the aluminium companies should be separated from the rest of T.I.'s activities for the purposes of any borrowing. He added that the directors did not foresee any need in the immediate future for new finance for the company, other than possibly the aluminium concerns.

INDIAN IRON & STEEL COMPANY, LIMITED—The company states that the figure of £131,209, given as the net profit for the year ended March 31, 1959, in our December 4 issue is after the deduction of £750,000 from transfer to Development Reserve, a like amount having been written back, on the other side of the account, as allocation from works and ore mines new extension reserve. These transfers have been necessitated by the wording of the Indian Income Tax Act. The net profit as declared to the Stock Exchange is, in sterling, £881,209, against £884,864 for the previous year. Before arriving at the profit for the year ended March 31 last, the following sterling amounts were placed to reserve: Depreciation, £1,500,000; reserves, £2,360,032; taxation, £139,688.

Orders are still not easy to obtain, state the directors of AITON & COMPANY, LIMITED, pipework specialists and ironfounders, of Derby, in a review of the current year. Profit margins may be somewhat lower than they have been in the past, but the directors add that there is evidence that the company's capacity will be fully employed for some time to come. Results so far this year are satisfactory and there is no reason to suppose that the final dividend will be any less than last year's 6 per cent. A 4 per cent. (same) interim is being paid. Because larger generating units are being installed in electric power stations both in the UK and overseas, some extensions are being carried out to enable fabrication of somewhat larger and heavier steel pipe assemblies than were necessary in the past. The South African subsidiary is passing through a rather difficult period and it is not easy to obtain a great volume of work at present, it is stated. Nevertheless, the Port Elizabeth works is now fully employed, but the directors would like to be able to see further ahead than they can. Prospects for the Australian subsidiary are good.

Dividend of JOHN SUMMERS & SONS, LIMITED, the Shotton, Chester, steelmakers, is being increased from the equivalent of 10½ per cent. to 12½ per cent. with a final of 8½ per cent. for the 53 weeks ended October 3, 1959, on a capital raised to £20,250,000 by a one-for-two scrip issue. The directors state that they hope to announce a 6 per cent. interim dividend in respect of the current financial year. There was a 4 per cent. dividend paid for the past year. Group profits of the company, of which Mr. Richard F. Summers is the chairman, advanced from £12,554,521 to £13,436,122 in 1958-59, against which £2,592,330 (£2,416,340) is charged for depreciation calculated to the actual cost of fixed assets and £1,700,000 (£1,800,000) is allocated to fixed assets replacement reserve. Deducting interest of £695,138 (£699,777) and tax of £4,300,000 (£4,590,000), the net profit of £4,148,654 compares with £3,048,404, of which the ordinary dividend absorbs £1,550,388 (£1,242,000). The tax figures include investment allowances relief and over-provisions of £760,000 (£372,000) and a transfer of £280,000 (£830,000) to tax equalization account. The unappropriated profit of £2,463,516 (£2,124,001) with credits added of £444,097 is transferred to revenue reserve.

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## Latest Foundry Statistics

*Steel Castings:* In the November issue of *Iron and Steel Monthly Statistics*, published jointly by the Iron and Steel Board and the British Iron and Steel Federation, it is reported that employment in steel foundries on October 10 was 17,190 or 40 fewer than on September 5. The average weekly production of steel castings during this period was estimated to be 5,500 tons which is a definite improvement on the average for the first nine months of the year, 4,700 tons. The latter figure is apparently definite.

*Copper-base Castings:* Figures issued by the British Bureau of Non-Ferrous Metals Statistics show that the production of copper-base castings during October was 6,898 tons. This is distinctly higher than this year's monthly average of 6,085 tons. The Editor of the JOURNAL estimates that the total for the year will exceed that of 1958.

## Export Publicity Council

The President of the Board of Trade has asked the following to act as members of the new Export Publicity Council, of which Mr. F. J. Erroll, Minister of State, Board of Trade, is chairman:—

Mr. R. P. S. Bache, managing director of Geo. Salter & Company, Limited, makers of springs, weighing machines, etc., of West Bromwich, chairman of British Typewriters, Limited, and a director of Crown Spring Company, Limited (representing the National Union of Manufacturers); Mr. R. A. Bevan (Advisory Council on Middle East Trade); Mr. S. Black (Institute of Public Relations); Mr. H. M. Braid (Incorporated Society of British Advertisers); Mr. W. P. N. Edwards.

Sir Patrick Hamilton, chairman of Expanded Metal Company, Limited, and the Cressall Manufacturing Company, Limited, and a director of Henry Simon (Holdings), Limited, Renold Chains, Limited, Simon-Carves, Limited, and Lloyds Bank, Limited; Mr. N. Jepson, a director of the Crown Diamond Paint Company, Limited, Canada, Wall Paper Manufacturers, Limited, Walpamur Company, Limited, and subsidiaries (Association of British Chambers of Commerce); Mr. M. Lubbock (British Latin America Chamber of Commerce); Miss E. Macdonald.

Mr. H. Oughton (Institute of Practitioners in Advertising); Mr. Brian Rootes, a director and chairman of a large number of companies in the motor-car industry (Dollar Exports Council); Mr. A. Wolcough (Advertising Association); Sir Walter Worboys, chairman of the Council of Industrial Design and former commercial director of Imperial Chemical Industries, Limited (Federation of British Industries); Mr. Lewis Wright (TUC). The secretary of the Council is Mr. J. D. Parker, Export Publicity and Fairs Branch, Board of Trade, London, S.W.1.

## BISF Appointments

Mr. Richard F. Summers, chairman of John Summers & Sons, Limited, will succeed Mr. Lewis Chapman as president of the British Iron and Steel Federation on January 1.

At last week's meeting of the Federation's Council, Mr. Charles Reginald Wheeler, chairman of the Guest, Keen Iron & Steel Company, Limited, was appointed president-elect of the Federation for 1960. Mr. Wheeler's appointment as chairman of Guest, Keen Iron & Steel was announced recently. He has been a member of the Council and the Executive Committee of the BISF and chairman of BISC (Ore), Limited, since 1946. He is also chairman of the Federation's International Trade Relations Committee. Mr. Wheeler is the president of the British Cast Iron Research Association, and his directorships include Guest, Keen & Nettlefolds, Limited, Associated Electrical Industries, Limited, and George Wimpey & Company, Limited.

### Technical College for Greenock

Mr. John S. Maclay, Secretary of State for Scotland, has announced that the Admiralty are prepared to free 3½ acres of the boom-defence depot in Greenock for the building of a new technical college. The ground will be available about the end of 1961. Greenock Town Council and Renfrewshire Education Committee have been urging this for some time as only about one acre is available at present on the Dalrymple Street site. Mr. John Crawford, director of education in Renfrewshire, said that it would take at least a year to complete plans for the college.

## Award of Trevelyan Scholarships

Trevelyan scholarships, tenable at Oxford and Cambridge universities and awarded to boys judged to possess exceptional personal qualities as well as the necessary intellectual ability, have been awarded for the second time. The scholarship trust was set up last year under the chairmanship of Sir Walter Benton Jones, chairman of United Steel Companies, Limited, when it was felt that a positive demonstration that personal qualities were as important as intellectual attainment might encourage boys to widen their interests and thus develop character and personality.

The scheme was sponsored by a number of well-known industrial concerns, among them Sir Walter's group, Associated Electrical Industries, Limited, English Electric Company, Limited, Guest, Keen & Nettlefolds, Limited, John Summers & Sons, Limited, Rolls-Royce, Limited, Steel Company of Wales, Limited, and Stewarts and Lloyds, Limited. Sufficient funds have been subscribed to permit the award each year of a number of three-year scholarships of £450 a year over a period of five years.

Not only do applicants have to subscribe to a fairly high standard of suitability from the academic viewpoint, but they also present an arduous and exacting task or project which they have undertaken and which is judged by experts in the particular field of the project, and they are also interviewed by representatives of the donor companies.

For the second selection 198 applications were accepted and 58 of these "short-listed." The awards this year have been increased by four to 23, but the selectors were impressed with the intellectual standard and personal qualities of the majority of the candidates.

## SCOW's £30,000,000 Plan

Estimated to cost £30,000,000, a scheme to increase sheet supplies before the first of the two major strip mills comes into operation was announced last week by the directors of the Steel Company of Wales, Limited. Financing will come entirely from the company's resources, plus bank borrowing. This is the fourth new development plan for SCOW and increased production is expected to begin at the end of 1961. Crude steel capacity is to be raised to 3,650,000 tons and the sheet and tinplate plant is to be extended.

When the present £52,000,000 development plan is fully operational in the first half of next year, production capacity will be 3,000,000 tons of ingot steel a year. A smaller £5,000,000 scheme, announced earlier this year and principally concerned with the tinplate production facilities, is also intended to give an additional 250,000 tons of ingots a year. The new scheme will provide the additional 400,000 tons of ingots necessary to reach the target of 3,650,000 tons.

No further additions to coke ovens, blast furnaces, or steel melting shops are envisaged in the plant, but certain modifications will be carried out, in the light of experience already obtained, to give increased efficiency and performance.

The two main features of the scheme are the installation of a continuous casting plant for the production of slabs—the only large-scale plant of its kind in the UK—and the construction of a 48-in. wide hot strip mill.

DAVID BROWN INDUSTRIES, Foundries Division, Penistone, played hosts to 350 children of their employees on December 12. Each child received a gift from Father Christmas. Members of the Penistone staff chaperoned the children.

# Law Cases

### Exposure to Pitch Dust

Holding that a craneman, Mr. David Kennedy Bell, had established that he was suffering from cancerous warts contracted through contact with pitch dust at work, Lord Cameron in the Court of Session, awarded damages of £1,750 against Mr. Bell's former employers, the North British Aluminium Company, Limited, a wholly-owned subsidiary of the British Aluminium Company, Limited. Mr. Bell sued for £5,000.

In his judgment, Lord Cameron said that after being employed by the company at its Fort William works for a year, Mr. Bell developed warts which were suspected of being cancerous and required eight operative treatments. Referring to a rota system laid down by the firm, Lord Cameron expressed the opinion that for a long time it was not operated and Mr. Bell was continuously exposed to pitch dust. He felt the plaintiff had succeeded in demonstrating that his employers failed to take a precaution which would have reduced the danger of exposure. He rejected the defendant company's plea of contributory negligence.

### Grinder's Claim Dismissed

Claim for damages of £250 by a universal grinder against the Chesterfield Tube Company, Limited, for a cut thumb caused in an accident at the works was dismissed by Judge Sir Henry Braund at Chesterfield County Court. He awarded costs to the company.

Mr. Frank Plater (40) said he was sharpening a metal cutter on a machine at the works when a grinding wheel which he was using on the cutter seemed to "grab" and the cutter suddenly accelerated its speed and cut his thumb. He claimed negligence on the part of his employers in that it was part of his instructions to hold the cutter by hand.

The judge said that it was a very slight accident, with no residual complications. He found it difficult to say that an employer was negligent for having used in his factory a machine on which there had been nothing even remotely resembling an accident previously. "I think it is putting it altogether too high to say that there was any negligence." It was expecting too much for an employer to foresee such an accident.

### Proof Lacking

A claim for personal injuries against the Power-Gas Corporation, Limited, of Stockton, failed at Middlesbrough on December 11. Mr. Joseph Newsham (29) claimed that gas escaping from a blast furnace caused him to become dizzy and fall 20 ft. while working for the Corporation on the construction of another blast furnace at Cargo Fleet Works, Middlesbrough, in April, 1957.

Judge Cohen, who gave judgment with costs for the corporation, said it was in September, 1957, that Newsham's solicitors wrote to the Corporation saying that an unsafe place of work was provided for Newsham at the time of the accident. If it had been said that Newsham was gassed, then it was extremely likely that records of gas tests made at the time would be available. The records had been destroyed because no one had asked the Corporation to keep them. Had the records been available he would have known who was right; as it was, proof that gas was the cause of the fall was sadly lacking. The judge added that anybody could make a mistake, "but Newsham's solicitors are experienced people."

# Book Review

**Steelmaking for Steelmakers,** by A. Jackson, A.Met., F.I.M. Published by United Steels Company, Limited, 17, Westbourne Road, Sheffield 10; price £2.

There is a shortage of books which deal with practical steelmaking and it is therefore very pleasing to receive one on the open-hearth steelmaking process. Mr. Jackson, the author, is a well-known personality in the iron and steel industry in this country. He has a reputation for being progressive and is one of the pioneers of the basic open-hearth method of steelmaking in large melting units. He has a wide experience of steelmaking and he is always ready to place his knowledge and ability at the service of his colleagues in the industry. It is therefore not surprising to find a man of his great energy and knowledge making available a review of modern open-hearth methods and techniques to the practical men actively engaged in steelmaking in the form of a series of technical articles which he contributed to the journal of the Iron and Steel Trades Confederation "Man and Metal." The present book has been based largely on the technical matter originally appearing in this book, but it has been further reviewed and brought up to date. The general secretary of the Iron and Steel Trades Confederation—Mr. Douglass—in a foreword to the book indicates the very close and active association which has always existed between Mr. Jackson and the men who have worked with him in the melting shops at Frodingham.

Mr. Jackson has a very easy way of expressing his scientific knowledge and experience in relatively simple non-technical language, and in the book he develops very carefully a logical and detailed review of a basic open-hearth steelmaking process as practised in this country at the present time. He deals with the problem of refractories, of instrumentation and control, and gives an explanation of the theory of combustion and the importance of the flame in the open-hearth process. The book deals with the chemistry of steelmaking in a very clear and logical way, and yet in a manner which should be easily understood by those who have only a limited knowledge of chemistry. The author considers the important part that good casting-pit practice plays in the production of high-quality ingots and he also has a most interesting section on teeming. In a section which deals with works costs, he has endeavoured to give to the furnaceman some indication of how costs are built up and states some of the financial responsibilities which management must carry.

In the latter part of the book Mr. Jackson writes on the use of oxygen for steelmaking and makes many valuable suggestions which should be of help to the young technician when thinking about future of technical developments of the open-hearth steel industry. This is a most valuable book and should be in the possession of, and read by, all melting-shop managers. It will also be of great help to supervisors who are actively engaged in steelmaking and should be made available to sample passers and leading hands who work on steel plants. Mr. Jackson is to be congratulated upon writing an excellent and practical book and the industry is grateful to him for this valuable contribution to present-day knowledge.

F. COUSANS.

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ON FRIDAY, DECEMBER 11, F. & M. Supplies, Limited, London, organized a dinner/dance to celebrate the 80th birthday of their parent concern. It was attended by approximately 130, almost exclusively members of the staff of the group, with their wives or other close relatives and the firms' agents. The function was held in the Abercorn Rooms and resembled nothing so much as a large "family party."

*Company Meeting*

# Hale and Hale (Tipton)

## PROGRESS IN A DIFFICULT YEAR

The 23rd annual general meeting of Hale & Hale (Tipton), Limited, was held on December 18 at Dudley, MR. R. C. LEPPINGTON (the chairman) presiding.

The following is an extract from his circulated statement:—

The year under review has been a most difficult one, but despite this your Company has made progress, and the position to-day is much healthier than it was this time last year.

The Group Trading Profit for the year ended August 4, 1959, amounts to £92,151, as compared with £93,689 for the previous year. The charge for taxation amounts to £19,566, as compared with £22,638, and there remains a consolidated Net Profit, after various adjustments, of £26,219, against £18,884, an improvement of £7,335. After deducting Dividends and Appropriations the balance carried forward is £26,627, as compared with £23,660 brought forward.

Shareholders have already been advised that the Company had a substantial holding of shares in the Midland Employers Mutual Assurance Company, Limited, and these shares were included in the Balance Sheet at cost price of £309. Since the date of the Balance Sheet these shares were exchanged for shares in Eagle Star Insurance Company, Limited, which were subsequently sold to produce a Capital Profit of £146,648. Your Directors recommend that a Capital Bonus of 3s. per share should be paid to the Ordinary Shareholders out of this Capital Profit, and the Balance will be retained for future development of your Company.

Since the relaxation of purchase tax on commercial vehicles in the last Budget, there has been a steady increase in our order-book. Within the industry demand is now overtaking productive capacity, and delivery dates are being continually extended. Although our foundries are now very busy, profit margins are insufficient when compared with the hazards of the malleable industry. We are still suffering from depressed selling prices, which are a legacy from the period of recession; but it is anticipated that with increased demand for our product, prices will rise to a more economic level.

The improvement in commercial vehicle output has acted as an impetus on other trades, and the demand in most sections of industry is increasing.

Your board feels confident of the future, and plans for the modernization and development of our plant are well in hand.

### Subsidiaries

CHATWINS, LIMITED.—In company with other solid fuel manufacturers this subsidiary has experienced a continued falling-off in demand for most of its products, being largely brought about by the changing pattern in the domestic heating and cooking field. It is believed by the Management that great changes will occur in the solid fuel industry over the next few years and, in this regard, the possible entry into other fields of manufacture is under review.

J. & J. WHITEHOUSE (TIPTON), LIMITED.—This subsidiary is still experiencing difficulty in recruiting suitable labour, but despite this, it continues to hold its own. Cast-iron hollow-ware for the export trade is produced by the Company under the trade name of "Phœnix."

HALE ENAMELLERS, LIMITED.—This subsidiary has done remarkably well during the year resulting from greater diversification of production, and there appears to be no slackening off at the moment.

J. WAKEFIELD & SONS, LIMITED.—During the year we moved this subsidiary from Birmingham and accommodated it in the premises of Chatwins, Limited, at Tipton. Personnel has been changed, and we are confident that the future will bring worthwhile results. The company manufactures paraffin heating and lighting appliances.

The report was adopted and the final dividend of 15 per cent. (making 20 per cent. for the year) and the Capital Bonus were approved.

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# *New Catalogues*

**Nozzles and Stopper-ends.** Leaflet AE 66, issued by the Morgan Crucible Company, Limited, Wandsworth Works, Point Pleasant, London, S.W.18, makes some interesting and important claims for the company's Salamander and plumbago stopper-ends and nozzles. Whilst not wishing to be pedantic, the reviewer has always deemed stoppers—the word used by Morgan's—as being constituted of sleeves and stopper ends. It may be that nomenclature has changed since he was an active steelmaker.

**Lubrication.** Using the title "Molybdenum Disulphide in Action," K. S. Paul (Molybdenum Disulphide), Limited, Angel Road, London, N.18, have issued an illustrated brochure detailing—in the form of reports from users—dozens of successful applications for their materials. So far as the reviewer can see, however, there is no report from the foundry industry. Nevertheless, the business of manufacturing castings is not devoid of lubrication problems, and no doubt the perusal of these case-histories will be of interest to readers.

**Non-metallic Building Goods.** The Universal Asbestos Manufacturing group of companies, 8, Upper Grosvenor Street, Grosvenor Square, London, W.1, in issue No. 10 of UAM *Group Products*, describe, illustrate, and give the dimensions of a very wide range of asbestos-cement and plastic components destined for use by the builder. They include gutters and fall-pipes in a wide variety, as well as corrugated sheeting.

**Hydraulic Variable-speed Gear.** Publication No. AL50/1 recently issued by Carter Gears, Limited, Thornbury Road, Bradford 3, gives comprehensive details of type AL50 hydraulic variable-speed gears available in ten sizes, ranging from fractional up to 40 m.p.h.

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### Rayburn Window Display Competition Result

The first prize in the Rayburn window competition, organized by Allied Ironfounders, Limited, has been won by Thomas Danks (Retail), Limited, Nottingham. The prize offered can be either £500, or a cabin cruiser, or the professional services of a leading window-display consultant for six months. The second prize of £200 has been won by Clumber Builders' Supply Company, Limited, Mansfield, and the third prize of £100 is claimed by Thompson & Parkes, Limited, Kidderminster. Prizes of £10 each have been awarded to 20 runners-up. (A photograph of the panel of judges was published in the November 19 issue of the JOURNAL).

# News in Brief

INTERNATIONAL FERROX COMPANY, LIMITED, is opening a new factory on the Holbrook Estate, Halfway, near Sheffield, for the manufacture of Vallak "hot tops" for ingot moulds. The hot tops are made from a mixture of coke breeze, sawdust and a binder, and are coated with a thin layer of refractory lining to prevent carbon pick-up. An exothermic coating may also be used.

THE HEAVIEST SINGLE PIECE OF EQUIPMENT for the iron and steel works in Durgapur, was recently despatched from the machine shops of the English Steel Castings Corporation, Limited, at Hawke Street, Sheffield, for Birkenhead *en route* for India. The anvil block is part of a seven-ton forging hammer which B. & S. Massey, Limited, Manchester, are supplying to the order of Davey & United Engineering Company, Limited, a member of the British consortium building the works.

FOLLOWING A RECENT VISIT to Canada of Mr. Darby Haddon, chairman and joint managing director of W. H. Dorman and Company, Limited, Stafford, and of Mr. J. W. Whimpenny, joint managing director, and general manager, the company has been awarded a contract for a large number of "L" series diesel engines for power generation in connection with the new 600 channel 1,200 mile-long micro-wave telecommunications system stretching from Grande Prairie, Alberta, to the Yukon-Alaska border.

PRESENTING THE PRIZES at the annual prize distribution of Rotherham College of Technology, Mr. L. W. Gummer, managing director of Gummers, Limited, valve manufacturers, Rotherham, said "The youth who sits back because he has got a certificate is not much value to himself or to an employer." Mr. Gummer presented a special prize from himself to Mr. Fred Sanders, who also won a silver medal as the best candidate of the year in the City and Guilds furnace brickwork first class final certificate examination.

SEVENTY-EIGHT MEN will be made redundant by the closure on December 18 of the foundry and engineering department of Brown's Foundry, Limited, Derby. Announcing this Mr. W. J. Brown, managing director, gave the reason as increased competition during recent years. The closure will not affect the showrooms and building materials department, employing about 30 people. The company, which has been in existence for nearly 100 years, manufactures castings for the engineering and chemical trades and builders' requirements.

AT A DINNER in Birmingham recently, 52 employees, with a total among them of nearly 2,000 years' service with the Walsall firm of Elkington and Company, Limited, received gold watches. The presentations were made by Mr. W. E. Ogden chairman of the Delta group of companies, of which Elkingtons is an associate, and by Mr. W. W. Dolton managing director. Each recipient had more than 25 years' service with the company, the original factory of which, in Newhall Street, Birmingham, is now the Birmingham Museum of Science and Industry.

DEPOSITS of over 100,000 tons of manganese-ore have been found near the village of Enyovche, in the Kirdjali district, Bulgaria. The ore which is near the surface, contains 35 per cent. pure manganese, and it is estimated that by the end of the year, 3,000 tons of ore will have been extracted. At Medet, near the Georgi Damyanov copper plant, large deposits of copper-ore containing molybdenum have been discovered. Bulgarian and Soviet experts are already drawing up plans for an opencast mine, a flotation factory and the extension of the copper plant.

EMPLOYEES of the Hull excavator factory of Priestman Brothers, Limited, who had been on strike for five days, returned to work last week. The dispute started after time and motion-study experts were introduced into the machine shop to speed up production in an effort to cope with increased orders. The company has agreed to revert to normal pay rates which existed before the experts were called in. Later, new methods are to be discussed with union officials in the hope of increasing output. This was the first stoppage at the factory in the history of the 90-year-old family business.

AN ORDER FOR THE FIRST TWO FURNACES for the new £10,000,000 development scheme of Steel, Peech & Tozer, Rotherham, has been placed with G. W. B. Furnaces, Limited, of Dudley, Worcestershire. With an internal diameter of 24-ft. they are nearly twice as large as any previously made in Britain, and will have a capacity of 150 tons. Each furnace will be able to melt at a rate of one ton per min. They will be of the German Demag swing-roof design and will be entirely of British construction, except for the regulator which has no equivalent in this country. The first furnace is planned to be in commission in January 1963.

Mr. G. E. D. HALAHAN, director and general works manager, of the Steel Peech & Tozer, branch of The United Steel Companies, Limited, presented prizes and awards to over 150 craft and technical apprentices at the firm's prize-giving at the end of last month. It was the largest number ever to have gained awards. Mr. G. W. Shield, headmaster of Mexborough Grammar School, said it was essential to develop the education of young people after they left school and industry had a very important task in this. Mr. R. Winder, the firm's education officer, said the company was considering the provision of an education centre to encourage young people to take a wider interest in the facilities offered for further education.

IN HIS QUARTERLY REPORT, Mr. G. H. Watt, secretary of the local employment exchange, states that, although having an unemployment rate of 3.6 per cent., Falkirk and district has improved considerably in comparison with Scotland as a whole, which has now an unemployment rate of 4.3 per cent. The seasonal recession in the light-castings industry rose in some degree during the spring and early summer, but this was much less severe than in 1958. Under-employment in the foundries at the moment was virtually non-existent and had been so since early November. Mr. Watt points out that the number employed in the light-castings industry falls year by year, and says that in future years the industry's labour force may well fall to an even lower level.

Mr. JOHN STRONG, managing director of British Oxygen Gases, Limited, presented awards to apprentices and long-service employees at Robert Jenkins and Company, Limited, engineers, Rotherham, on December 3. Mr. A. R. Jenkins, chairman and managing director of the firm, who has recently come back from America, said that the United States standard of education at the age of 18 was not very far ahead of what it was here at 16. He said there were no apprenticeship schemes there and young people leaving school at 18 were expected to pick up a job by going and working at it. Less skill was required in most U.S. factories because of the amount of mass production. "They are machine minders and people who push buttons," he said.

## Baker Perkins Foundry Machinery at work . . . *at Joseph Bloomer & Sons Ltd.*

This "Cadet" Rotary Table Shot Blast machine has been installed at Joseph Bloomer & Sons Ltd. where its high standard of finish and sound design have made it an extremely useful addition to this company's foundry equipment. The machine includes our patented bi-phase impeller system with low power consumption. No pits or special foundations were necessary. Please write for full details.

BAKER PERKINS
*Foundry Machinery Division*
REDEWELL WORKS · HEBBURN ON TYNE · ENGLAND

BP/F1

HISTORICAL NOTE

Joseph Bloomer & Sons Ltd. were established in 1860. At their Ladysmith Foundry and Chain Works, which are in Cradley, Staffordshire, they produce a wide range of castings for gas and calor gas cookers, agricultural and textile machinery, the motor industry, continuous burning fires and stoves and many other applications.

## Personal.

Efco, Limited, announce that Mr. GEORGE B. COOKE and Mr. J. S. MORTON have been appointed to the board.

Mr. ALEXANDER S. MACLELLAN is to retire from the board of Glenfield & Kennedy Holdings, Limited, on December 31.

Mr. Edward Heath, Minister of Labour, has appointed Mr. JOHN M. HOWARD, M.P., to be his Parliamentary Private Secretary.

Mr. STAN WOOD, editor of *The Stantonian*, the works magazine of the Stanton Ironworks Company, Limited, is to retire at the end of the year.

Mr. J. WILCOCK has relinquished his post in the department of industrial metallurgy at Birmingham University to take up a position with Powder Metallurgy, Limited, London, W.1.

Mr. T. P. EVERETT has resigned from the boards of Richardsons Westgarth & Company, Limited, Richardsons Westgarth (Hartlepool), Limited, and Richardsons Westgarth Atomic, Limited.

Mr. K. P. JAMES, M.I.B.F., is now appointed general manager of Tredomen Engineering Works of the National Coal Board. He was previously works manager, having held that position since 1953.

Mr. FRANK JAMIESON and Mr. ALBERT MASKETER have been elected directors of Thomas Blackburn & Sons, Limited, ironfounders and general engineers, Preston. Mr. THOMAS BLACKBURN has retired from the board.

Mr. T. RAMCHANDRAN has obtained the degree of *dokter-ingenieur* of the Technical University of Bergakademie Clansthal, West Germany. In the spring of 1961 he will be appointed to a teaching post at the Indian Institute of Technology, Madras.

Mr. A. M. WHITE, a director of Bertrams, Limited, ironfounders and general engineers, Edinburgh, will retire at the end of this month. Mr. T. S. F. Melvin, managing director, has relinquished that post, but will remain on the board and has been invited to become chairman.

Mr. J. A. MACKINNON has been appointed joint managing director of Henry Gardner & Company, Limited, in succession to Mr. R. T. DE POIX who has retired but remains on the board. Mr. MacKinnon has resigned as secretary and is succeeded by Mr. K. G. HEWSON. All these changes take effect from January 1, 1960.

Mr. J. E. HOAR, chief technical engineer of E. D. Warburton and Company, Limited, Bury (Lancs), has been appointed a director of the company. The company have also appointed Mr. LESLIE DURRANT, development engineer with the Olives Paper Mill Company, Limited, as technical representative resident in the South of England.

The GROUP STATUARY of Boulton, Watt and Murdoch, which stands outside the College of Commerce in Broad Street, Birmingham, has won for the sculptor, Mr. William Bloye, the Sir Otto Beit Medal for 1958-59. The award is made annually for the best work of art to be exhibited to the public in any part of the United Kingdom or the Dominions, outside London.

Mr. WARWICK M. DINGLEY, aged 40, sales director of Stanley Works (Great Britain), Limited, joiners' tool manufacturers, Sheffield, has been appointed in charge of an organization established to handle marketing in Europe for all products manufactured by the Stanley factories in the United States, Great Britain and Germany. He will have the title, director of marketing, Europe, and will have headquarters in Zürich.

Mr. E. R. DUNNING, until lately assistant works manager with the Midland Electric Manufacturing Company, Limited. Tyseley, Birmingham, has been appointed to the board of Metals & Equipment (Wolverhampton), Limited, as sales director. A student of Coventry Technical College and Birmingham University, Mr. Dunning served his apprenticeship with British Piston Ring Company, Limited; from 1947 to 1952, he was secretary of the Birmingham branch of the Institute of British Foundrymen and president in 1954.

Edgar Allen & Company, Limited, announce the following appointments to the boards of four subsidiaries:—British "Rema" Manufacturing Company, Limited: Mr. J. P. LEWIS, Mr. W. G. A. JENKINS, and Mr. J. HIGGINBOTHAM. Buell (1952), Limited: Mr. W. J. MCBRIDE and Mr. F. A. ROSS. J. H. Humphreys & Sons, Limited: Mr. G. W. TURTON, Mr. F. HAIGH, and Mr. W. C. GARRISON. Park View Steel Works, Limited: Mr. F. HAIGH, Mr. G. C. LONGDEN, Mr. W. H. EVERARD, and Mr. L. F. KEELEY. Mr. D. F. TIPLADY has been appointed secretary of Buell (1952).

Mr. C. W. B. BEAGRIE, director and technical sales manager of West Hunwick Silica & Wirebrick Company, Limited, Crook, Co. Durham, is leaving to join the board of G. P. Hinckley & Sons, Limited, Sheffield, on January 1, 1960. He will also be general sales manager of the associate companies, Hinckleys, Limited, Kingscliffe Super-Refractories, Limited, Hinckley Silica Sands, Limited, and Durhills, Limited. Mr. Beagrie commenced as an apprentice engineer with Synthetic Ammonia & Nitrates, Limited, now Imperial Chemical Industries, Limited, and was later with Head, Wrightson & Company, Limited, and General Refractories, Limited.

The Incandescent Heat Company, Limited, are seconding Mr. B. A. HARPER to the staff of A.B.M.T.M. (India), Limited. His post will be that of senior furnace technician (India), and he will take to the company a specialized knowledge based on his 10 years' experience with the Smethwick firm, gained in the foundry plant division, development division, and the export division, where he was engaged on technical sales to the Indian market. As designers and builders of industrial furnaces, the Incandescent Heat Company, Limited, Smethwick, have supplied capital goods to India for almost half a century and throughout this period has been represented by A.B.M.T.M. (India), Limited, the manager of which firm is Mr. J. S. HALBERT.

## Obituary

Mr. THOMAS WILLIAM SHIELDS, who was employed by the Eastwell Iron Ore Company for 50 years, has died at the age of 80.

The death has occurred at the age of 89 of Mr. CHARLES BENNETT, a former director of the Wellfold Foundry, Limited, Clitheroe (Lancs).

The death is announced of Mr. EDWARD ROLAND DUNSBY, who died on December 7, aged 44. He was sales director of G. Clancey, Limited, Halesowen, Birmingham, and had been with the firm for 14 years.

The death is reported of Mr. GEORGE RICHARD SUTTON DARROCH, who was assistant works manager at the Crewe Locomotive Works from 1917 until he retired in 1941. He was 79.